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Novel Blast Furnace Skip Bridge Construction

Shear Leg Used to Carry Hoist at Remodeled Plant of Globe Iron Co.—New Automatic Method for Charging Stock

The Hanging Rock district in southern Ohio, once noted for its stone stacks and charcoal furnaces where iron "was not made on Sunday", has witnessed the modernization of all but a few of the early blast furnace plants. Improvements made more recently include those at the works of the Marting Iron & Steel Co., Ironton, the Wellston Steel & Iron Co., Wellston, the Star Furnace Co. and the Globe Iron Co., Jackson.

At the Globe plant, the conversion of the blast furnace from a hand-filled stack to one charged by means of a skip bridge, led to an improved automatic charging device, as well as a method for supporting the skip bridge that assumes precedence as the first installation of its kind.

The transformation of the old hand-filled furnace presented several problems to the engineer designing the remodeled plant. The principal barrier was in modifying the customary methods of carrying the skip bridge to permit the retention of the elevator for hand-filling the furnace, which equipment the company desired to hold in reserve for emergency use. The arrangement finally evolved, and now in successful operation, carries the skip bridge on a shear leg, so supported as to equalize the weight of the bridge on the shell, and, at the same time, give clearance for the inclined tracks of the bridge to describe an arc above the furnace, thus affording ample room for hand operation when desired and leaving the old elevator equipment intact. The principal advantage claimed for the shear leg method of supporting the skip bridge is the elimination of any horizontal thrust on the stack. An added advantage is the more symmetrical distribution of the weight about the entire shell.

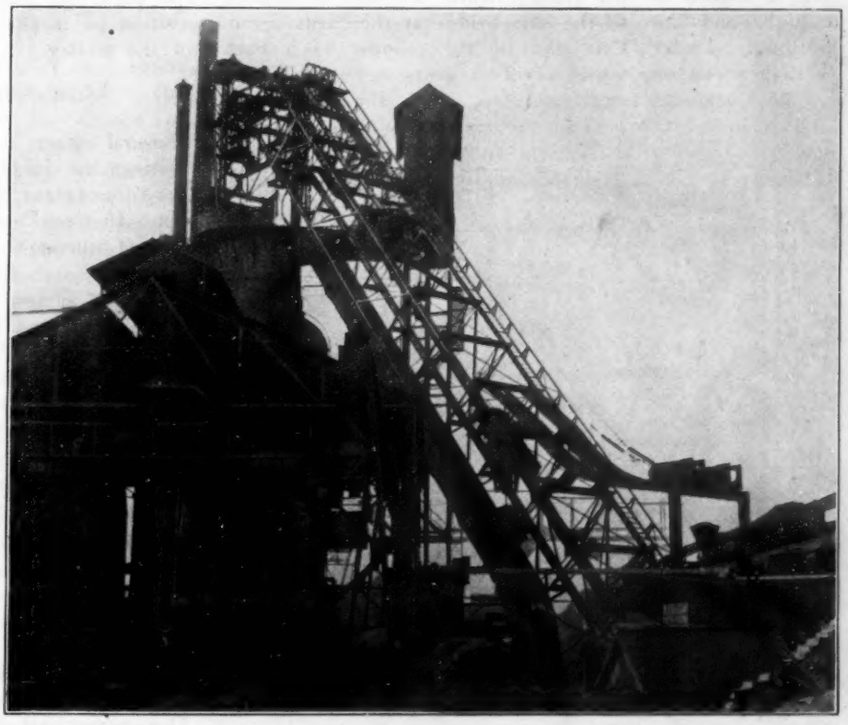


FIG. 1—VIEW OF STACK, SKIP BRIDGE, CAST HOUSE AND MAGNET. THE SPILL PLATE IS UNDER THE BRIDGE

Another difficulty lay in the fact that it was impossible to erect a skip bridge directly from the furnace to the tracks serving the storage bin, owing to the cramped quarters and the arrangement of the old tracks. This obstacle was overcome by placing the bridge at a 45-degree angle east of a line drawn from the furnace at right angles to the tracks.

Revolving of the stock is the only automatic charging device, but the plant was designed to run as independent as possible of any neglect on the part of the workmen. This was secured through automatic loading, while the speeds of the trolley, at top and bottom, are fixed and are not controlled by the engineer in charge of the power plant. The stock is carried in cylindrical buckets, and the charging thus comprises both the double bell and revolving distribution of the stock. The J. W. Frazier Co., Cleveland, was the engineer and designer.

In addition to the new skip hoist, the company installed a new stock bin for ore, coal, coke and limestone, extended its storage yard, which is now served by an ore bridge, installed an electric crane and magnet in the cast house, made additions to its power equipment and improved its arrangements for disposing of cinder. Work was begun in May, 1912, and the stack blown-in July 15, 1913. The Variety Iron

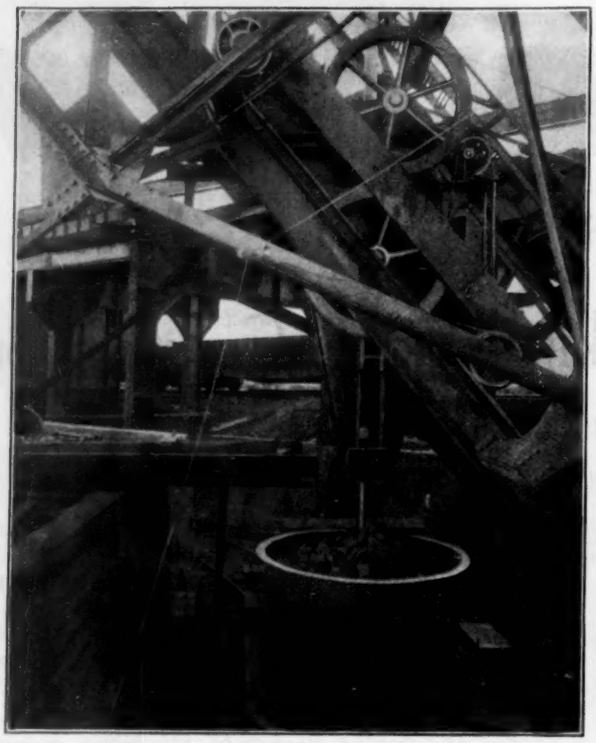


FIG. 2—CYLINDRICAL BUCKET UNDER TROLLEY

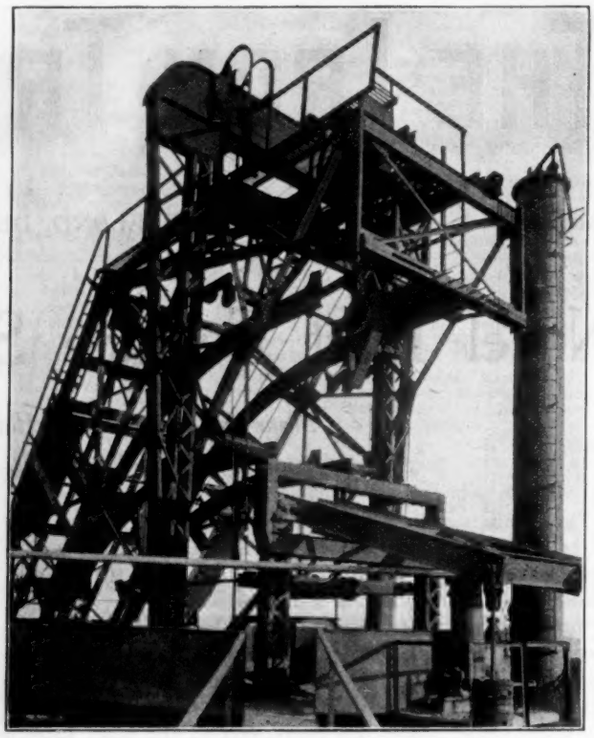


FIG. 3—SIDE VIEW OF SHEAR LEG

& Steel Co., Cleveland, was the contractor for the bin, skip bridge and trestle work.

The cylindrical buckets are loaded under the bins and carried on an electric scale car to the skip bridge, as shown in Fig. 2. The stock is weighed as the buckets are loaded. The buckets have a capacity of 100 cubic feet, being 5 feet 6 inches in diameter and 5 feet high, and are provided with bell bottoms. Under the bridge a central T-shaped rod on the bucket, shown in Fig. 4, engages a double hook on the trolley. At the furnace top the bucket is lowered until rests at the sides come in contact with supports on the hopper, thus arresting the bucket shell. The bell continues downward, letting the stock into the furnace hopper. The uniform distribution of the stock is secured by automatic revolutions of the bucket by means of a plunger engaging the faces of a rotating disc. This plunger is attached to the trolley, while the disc is secured to the skip bridge at the furnace top. One end of the plunger is a rack which revolves gears keyed to a vertical shaft to which the hook, supporting the bucket, is attached. The disc at the Globe company's plant has five faces, located at varying distances from the center line of the furnace. The bucket turns one-fifth of a revolution each trip. The disc, of course, can be provided with any number of faces. The trolley, as it starts down the incline, comes in contact with a sickle which, swinging around, revolves the disc, presenting a new face for the plunger on the return trip. The bucket is returned to its original position by means of a counterweight on the trolley.

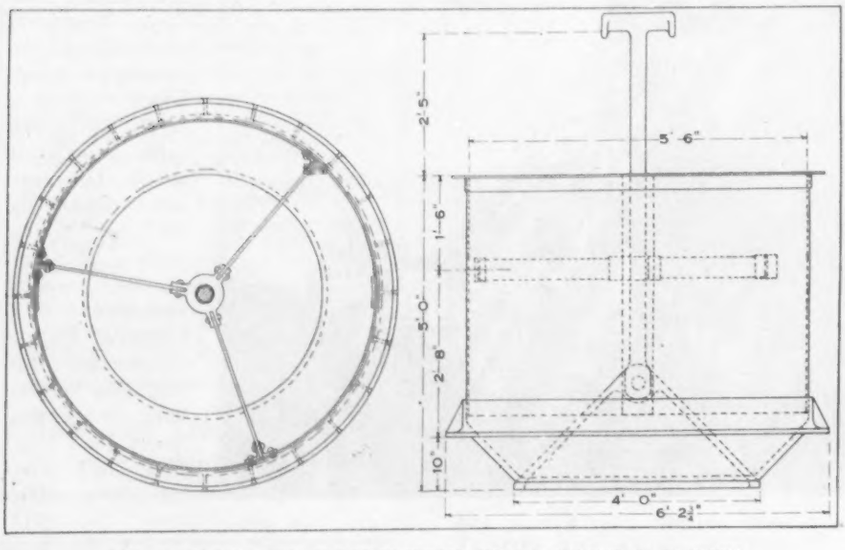


FIG. 4—PLAN AND CROSS-SECTION OF CYLINDRICAL BUCKET

Similar Installations

Several other installations for distributing the stock, similar to that at the Globe plant, are now in operation. In one, four hand buggies are dumped through a conical hopper, while in another the bucket is revolved on a car. A third method is to place the cylindrical bucket on a fixed turntable in a pit, the table being revolved. The designer of the Jackson plant claims these advantages for his method: That it eliminates the hand labor and prevents the possibility of uneven charging, due to the failure of the workman to revolve the bucket or table.

The shear leg, shown in Fig. 3, is 35 feet high, 16 feet wide and is built of channels. These are set on grillage, the weight of the skip bridge being transmitted through brackets located on the center line of the shell. The symmetrical partition of the load is insured, as the weight is carried at two places on the furnace shell, and

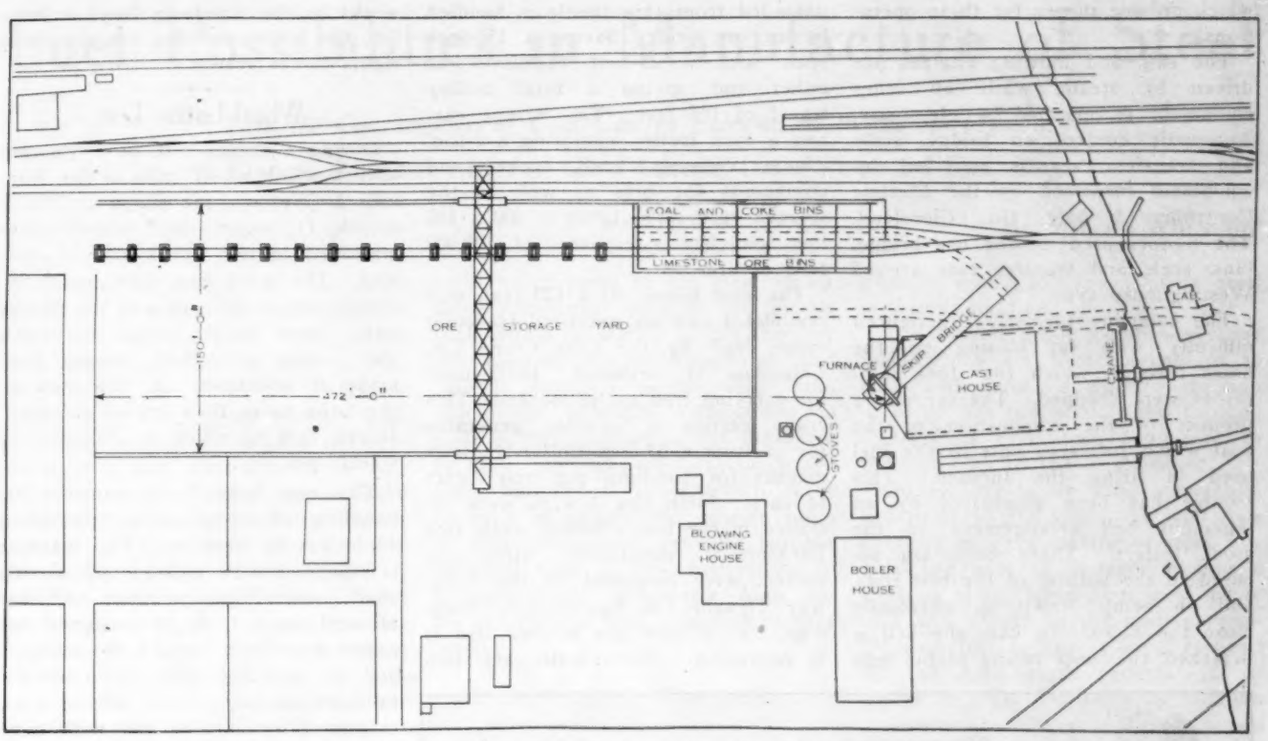


FIG. 5—LAYOUT OF REMODELED PLANT OF THE GLOBE IRON CO.

through the brackets this is distributed some distance in both directions from the junction of the leg and shell.

From the top of the shear leg, eyebars are dropped, which are pin-connected to the leg and skip bridge, thus affording a flexible connection. The skip bridge, which is 146 feet 5 inches long, is pin-connected to a support at the bottom, placed in a concrete foundation.

The shear leg was built at a slight angle from the vertical to allow for expansion when the furnace is in blast. This expansion is easily cared for, since the skip bridge is flexibly but firmly supported at the bottom, and the heat from the furnace results in the shear leg straightening to a vertical position. The height of the shear leg would permit a considerable variation at the top of the leg without appreciable lateral thrust on the top of the furnace shell.

Counterweights on Trolley

Owing to the necessity for retaining the hand-filling apparatus, the inclined trolley track is some distance from the furnace at the top of the lift, as shown in Fig. 1. At a suitable distance above the furnace, the tracks describe an arc, approaching the center line of the stack on a horizontal plane. As the trolley passes this arc on its upward trip, it grips a hook which is connected by wire rope to counterweights at the bottom, shown in Fig. 1. When the trolley begins its return trip, these counterweights aid in pulling the trolley along the level track until it reaches the incline.

The trolley is driven by a steam engine installed by the Otis Elevator Co., and through counterweights little burden except that of the load and buckets is thrown upon the engine. The control of trolley speeds at each end of the travel, is regulated by means of an automatic cut-off attached to the engine. The speed with which the buckets and furnace bell are lowered or raised is controlled automatically by providing set throttles on the air and steam exhausts connected to the steam cylinders,

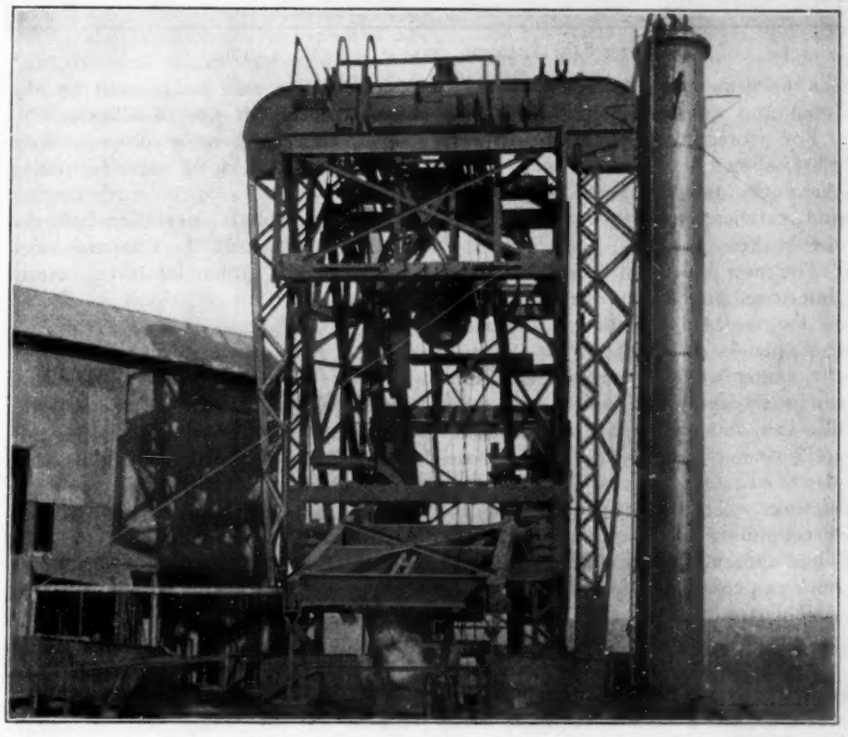


FIG. 6—REAR VIEW OF SHEAR LEG, SHOWING ELEVATOR FOR HAND-FILLING THE FURNACE

which provide power for these operations.

The skip and blowing engines are driven by steam, while all other equipment is operated by electricity. Automatic control on bridge, scale and transfer cars is provided by equipment furnished by the Electric Controller & Mfg. Co., Cleveland. The motors used on the ore bridge, bins, scale and transfer cars are of Westinghouse type.

The company formerly experienced difficulty with tar closing up the holes through which the stock indicators were dropped. The tar was a product of the combustion of the coal which furnishes part of the fuel used in firing the furnace. This trouble has been eliminated by an ingenious bell arrangement on the stock testers. These bells are secured to the bottom of the test rods, and on being drawn up effectually close the holes. In case the bell is detached, the inner casing of the tube can be drawn up, a new bell substituted and quickly put in place.

For protecting the workmen a spill plate, shown in Fig. 1, extends under the entire length of the skip bridge and catches any stock falling from the buckets.

The new steel bin for storing ore, limestone, coal and coke is 120 feet in length, being divided into six 20-foot panels. Partitions run through the center and between panels. The bin is 28 feet high, 36 feet wide over all and has a storage capacity of 1,452 tons of ore, 1,128 tons of limestone, 612 tons of coal and 312 tons of coke. Tracks on top permit the direct filling of the bin from cars. The apparatus for filling the ore buckets consists of undercut gates which are opened and closed by clutches on line shafts, operated by a 13½-horsepower motor.

A trestle, 320 feet long and erected on concrete pilasters, extends from the bins into the storage yard. Stock unloaded from this trestle is handled by an ore bridge having a 150-foot span with a 25-foot cantilever at either end, giving a total trolley travel of 175 feet. This bridge carries a man trolley operating a 3-ton, 2-rope Williams grab bucket and commands the bins as well as the storage yard. The latter is 400 x 150 feet and has a capacity of 100,000 tons of ore.

The cast house, 60 x 120 feet, was remodeled and an overhead traveling crane, built by the Case Crane Co., Columbus, O., installed. It is used for carrying iron to be stocked. This crane carries a separate generator for exciting a 63-inch Cutler-Hammer magnet for handling pig iron direct to cars. Four new boilers were installed in the boiler house, while two 100-kilowatt generators, direct-connected, were furnished by the Ridgway Dynamo & Engine Co.; Ridgway, Pa. A new gas washer also is in operation. Three ladle cars, two side and one end dump, built by the M. H. Treadwell Co. of Illinois, Chicago, carry slag some distance from the plant, where it is used for filling purposes.

Eben Jones is president of the Globe Iron Co., H. L. Chapman, vice president and John E. Jones, secretary-treasurer.

PUTNAM 42-INCH COACH WHEEL LATHE

Bleichert's London Company

Adolph Bleichert & Co., of Leipsig, Germany, who have long been represented by a branch in London, have founded an independent company there known as Bleichert's Aerial Transformers, Ltd., with offices in Egypt house, New Broad street. The directors include Beda Becker and Paul Bleichert, of the parent company. In this country, the Trenton Iron Works is the licensee of the Bleichert system, which has been extensively installed in the west, and in consequence of the acquisition of those works by the American Steel & Wire Co., the latter now has the American rights to the system.

Wheel Lathe Test

During a recent test of a Putnam 42-inch coach wheel lathe at the Norfolk & Western car shops at Portsmouth, O., eight coach wheels were machined in two hours and 33 minutes. The work was done under ordinary shop conditions and the wheels were taken in the order in which they came, no effort having been made at selection. In this manner, the lathe more than tripled its guaranteed output, which is 20 pairs of wheels per day.

This new lathe has a capacity for handling wheels up to and including 42 inches in diameter. The machine is equipped with nickel steel driving shaft, ring oiling bearings and has all-steel gears. It is designed for power movement toward the tailstock and is provided with an automatic tailstock binding device, driving dogs, calipering attachment and with combination tool holder, which carries a roughing tool and a full width forming tool. The machine weighs approximately 80,000 pounds. In the accompanying illustration is shown one of these machines with single pulley drive, which is provided with six mechanical speed changes. It also may be furnished with motor drive, either direct or alternating current. Three of the lathes recently were installed by the Chicago, Milwaukee & St. Paul and two by the Norfolk & Western railroads. They are built at the plant of the Putnam Machine Co., Fitchburg, Mass., which is now owned by Manning, Maxwell & Moore, Inc.

Book Review

Foundry Machinery, by E. Treiber, 148 pages, 51 illustrations, published by D. Van Nostrand Co., New York City, and furnished by THE IRON TRADE REVIEW, Cleveland, for $1.25, postpaid.

This work, which is translated from the German and which is largely adapted to British practice, is devoted largely to a discussion of molding machine practice. One chapter is devoted to the treatment of molding sand which has reached a high state of development in Germany, while the use of molding machines is discussed in six chapters. Cleaning machinery also receives considerable attention and the use of sand blast equipment, hoisting and conveying appliances, etc., also receives attention.

Fuel Possibilities in Manufacture of Steel[1]

How the Consumption of Coal Can be Economized in the Open-Hearth Process, With Side Lights on Gas Producers, Use of Pulverized Coal, Etc..

By William Whigham[2]

Perhaps no country in the world has been so favored by nature in the way of great quantities, high quality and wide occurrence of fuels as that portion of the American continent occupied by the United States. And, as seems inevitable in the development of a new country rich in natural resources, extravagances and waste have taken place in the earlier periods of that development. Man is always prodigal of that which is plentiful and easily obtained. But we have now reached a period where not only the necessity brought about by the desire of lower costs of production, but also an awakened public conscience, is compelling a more efficient utilization of these great natural resources. While they still occur over wide areas and are yet found in large quantities, they are not inexhaustible. We, in whose hands is placed the responsibility of their development and utilization, should not be unmindful of the claim upon them by future generations, and our efforts should be toward the adoption of such methods and the use of such appliances as will conserve them to the utmost degree.

Fuel in Steel Production

In the manufacture of steel no single item is of greater importance than that of fuel. The high temperatures at which the metals separate from the elements with which we find them associated in nature and at various stages of manufacture have placed our fuels on a plane of equal importance with the raw materials themselves, and their location has firmly entrenched certain districts as strongholds of iron and steel production. The natural fuels which enter into the making of steel proper are found in the solid, liquid and gaseous states. The liquid and gaseous forms generally belong to that numerous group of combinations of hydrogen and carbon designated as hydro-carbons. For the purposes of this discussion all fuels may primarily be divided into two groups.

The first group comprises those fuels which come to the steel maker as a component part of the metals with which he works, as for instance the carbon, silicon, manganese and sulphur contents of the pig iron. While not generally referred to as fuels in this connection, yet these are as truly fuels and perform much the same function as those which occur as such in nature and require more or less preparation for the purpose intended, that is, the maintenance of a temperature sufficiently high for the thermo-chemical reactions to take place.

Importance of First Class

The fuels listed under this class as occurring in the iron received by the steel maker require little attention, as their quantity and consumption, within certain limits, and the methods of their combustion are both approximately fixed. They are of great importance in the Bessemer process, furnishing as they do the sole fuel used in this branch of steel making. The heat units in one gross ton of representative Bessemer are given in Table I.

As the sulphur and phosphorus are not oxidized to any extent in the Bessemer process, no heat value has been assigned to them. Practically all the silicon, carbon and manganese are burned in the process, and it will be noted from Table I that the heat equivalent for oxidation of the entire quantity of these three constituents amounts to only about 1,750,000 B. T. U. per gross ton of iron blown, or, say, 2,000,000 B. T. U. per ton of steel ingots produced. This is equivalent to 148 pounds of coal having a heat value of 13,500 B. T. U. per pound. This shows how efficient the Bessemer process is as regards fuel consumption when compared with the open-hearth process using 450 to 600 pounds of fuel per ton of steel in addition to the fuel content of the iron itself.

Were no metallurgical questions involved, the Bessemer process of making steel would probably never have been replaced. The matter of phosphorus elimination, however, has compelled recourse to the open-hearth process where low phosphorus steel is a consideration.

The second group comprises those fuels which are found in nature as such and must be adapted through more or less preparation and through the use of extraneous equipment to the purposes of the steel maker.

On account of its wide occurrence, proximity to the other raw materials entering into the making of steel, low cost and ease of conversion into a gaseous state, bituminous coal probably will always be the most generally used fuel in the making of steel by the open-hearth process. It is found in great quantities in Western Pennsylvania, West Virginia and southeastern Ohio, which renders it available for use with local fluxes, Lake and imported ores; in Alabama and Tennessee in close proximity to ore and limestone beds there; in Indiana and Illinois near the Lake ore supply; and in Colorado and Wyoming close to the western ore supplies. It thus will be seen that, both from the standpoint of quantity and location, bituminous coal has a position in the manufacture of steel not easily replaceable by any other fuel.

The proximate analyses and heat values of the coals of the four abovementioned districts are given in Table II.

Gas Producer Fuel

On account of its simplicity of operation, the gas producer, to the present time, has been the means most generally employed for the utilization of coal in the making of steel in the open-hearth furnace. The making of producer gas is based in general upon the transformation of the free carbon of the fuel into carbon monoxide gas, and it is easily understood, therefore, that the fuel containing the largest amount of fixed carbon will be the most desirable. In the process of gasification in the producer the carbon of the fuel is burned to carbon dioxide, the latter being then reduced to carbon monoxide by contact with additional carbon as it rises through the fuel bed. In order to effect reduction to carbon monoxide less air is admitted than is necessary for complete com-

[1]Presented before the American Iron and Steel Institute.

[2]Assistant to the president, Carnegie Steel Co., Pittsburgh.

bustion and the height of the fuel bed is regulated according to the quantity of the fuels used.

The uniform passage of the gases of combustion through the upper fuel bed is of prime importance, and therefore the crushing and screening of coal to a uniform size for use in producers is practiced where best results are desired. Even with this extra precaution, however, the formation of clinkers and blow-holes throughout the fuel bed is unavoidable unless some method is used of keeping the fuel stirred up. This end was attained at first by hand-poking, and hand-poked producers are still used generally. The disagreeable character of the work, the expense of labor involved, and the irregular results obtained have led to the development of several designs of mechanically-poked producers. Steel works engineers are not unanimous as to the advantages of one or the other of the two classes of gas producers mentioned, and this is probably due in this instance, as in many others connected with engineering and industrial operations, to a lack of accurate data concerning the performances of the two classes of apparatus. Generally speaking, the choice ought to be made on the following points: Cost of installation, cost of operation, labor supply and efficiency.

Table I.

HEAT VALUE IN ONE GROSS TON OF BESSEMER IRON.

Element.	Per cent.	Pounds.	Heat Value per lb. B. T. U.	When burned to	Total heat value in gross ton of Bessemer metal B. T. U.
Iron	93.67	2,098.2	.....	.....	.....
Silicon	1.45	32.48	12,600	SiO_2	409,248
Carbon	4.00	89.6	14,500	CO_2	1,299,200
Manganese	.75	16.80	2,975	MnO	49,980
Sulphur	.04	.90	.....	.....	.....
Phosphorus	.09	2.02	.....	.....	.....
Totals	100.00	2,240.00	.....	.....	1,758,428

Cost of Producer Equipment

The first cost, based on large installations, will be about the same per open-hearth furnace served, and may be stated in round numbers as $25,000 per furnace in either case, which figure includes four hand-poked or two mechanical producers with all coal and ash handling equipment complete. The rated capacity of a 10-foot, hand-poked producer is 1,000 pounds of coal per hour gasified; the average actual capacity is about 800 pounds per hour, and as a rule about four of these producers are installed for each open-hearth furnace. The rated capacity of the mechanical producer is about 2,000 pounds of coal per hour and its actual operating capacity in the neighborhood of 1,600 pounds per hour. Up to the present time it has been usual to install two mechanical producers per open-hearth furnace, but in some cases five producers have been installed for two furnaces, and it has been suggested that the larger furnaces, making 90 tons of steel at a heat, have three producers each. It can hardly be said that this large producer capacity has been yet justified by results.

A comparison of the cost per ton of coal gasified, including maintenance and repairs as well as direct labor and supplies, for two large plants, shows the following:

Cost to gasify a gross ton of coal (2,240 pounds) hand-poked equipment	$0.745
Cost to gasify a gross ton of coal (2,240 pounds) mechanical equipment	.444
Difference in favor of mechanical installation	$0.301

This difference is practically all in the direct labor as will be seen from the figures below, taken from the same cost sheets.

Direct labor cost to gasify a gross ton of coal, hand-poked equipment	$0.509
Direct labor cost to gasify a gross ton of coal, mechanical equipment	.213
Difference in favor of mechanical equipment	$0.296

These figures indicate about two and one-half times as much labor for the hand-poked as for the mechanical installation, and the whole disadvantage of this excess labor is not indicated by the extra cost. The difficulty at times in securing labor for this purpose is an important element in the decision.

Both types of producer will deliver to the furnace, either in the form of sensible heat or heat of combustion, 85 to 90 per cent of the total heat in the coal received by them. Average combined producer and furnace practice will show about 550 pounds of coal to the ton of steel, or 7,425,000 British thermal units, based on 13,500 British thermal units per pound of fuel.

The conclusion of the writer from the above data is that the mechanical producer should be used in all large installations. It would appear also, from the fact that the mechanical producer has been perfected to an extent where it requires less than one-half the labor for the older type, and, as stated, shows from 85 to 90 per cent efficiency as a gas-making apparatus, that radical improvements in its operation are hardly to be looked for. The principal losses, being loss of fuel in the ash and radiation from the producer itself and piping carrying the gases to the furnace, can hardly be expected to be reduced any considerable amount.

Coal By-Products

The by-products of coal, such as tar and coke-oven gas, present greater opportunities for advancement in fuel efficiency, but have their limitations on account of quantity available.

Wherever tar can be obtained in sufficient quantities, its use has been attended with considerable success. Practice in burning tar as a fuel for steel-making purposes shows that from 30 to 35 gallons of tar to the ton of steel is easily attainable, and as each gallon contains on an average about 160,000 British thermal units, the total heat in the fuel required to make a ton of steel with tar is about 5,200,000 British thermal units as compared with 7,425,000 British thermal units in the case of average producer practice, or about 70 per cent. This is partially accounted for by the fact that the radiation and other producer losses in the case of coal are not present where tar is used. The figures given, namely, 30 to 35 gallons of tar per ton of steel, were obtained on a 40-ton furnace and represent by no means the economy which might be looked for on a larger furnace. The method of burning tar is to heat it by steam coils to a point where it will readily flow and inject it in an atomized condition through the bulkhead wall of the furnace. Many types of burners have been tried, but nothing better has been found than the simple device consisting of a tar tube inside a tube through which the atomizing air is blown, both tubes being drawn to a relatively small orifice at their delivery ends. The pressure of air used for atomizing is about 80 pounds.

The cost of installation, including tar tanks, pumps, air compressors, etc., is small, being in the neighborhood of $1,500 to $2,000 per furnace. As to the possibilities of tar as a

fuel for steel-making, its limitations are, as stated above, in quantity rather than in any other direction. The uniformity and degree of heat attainable are all that could be expected by the steel maker, but, in view of its comparatively limited production and use in many other directions, it is hardly likely that it will attain any great prominence as a steel-making fuel.

Experiments with by-product coke oven gas for steel making have been few, and practically no data are available. The quantity of this gas is rather too small in amount and can be utilized so easily to advantage in other directions that it is hardly likely that it will be much of a factor in steel making. It has been used to a considerable extent in the heating of steel for rolling mill purposes and seems to be perfectly satisfactory for this use.

Use of Pulverized Coal

One of the most promising methods of using coal, both as to the low first cost of equipment and economy in fuel consumption expected from the process, is in the pulverized condition. Coal in this form has been used for some time in the burning of cement, in puddling furnaces, in steel-heating furnaces and to some extent under steam boilers. Its advent as a steel-making fuel has taken place only recently. The principal points to be taken care of are a thorough drying of the coal, pulverizing to a degree of fineness which will permit 90 per cent of the fuel to pass through a 200-mesh sieve, and its injection into the furnace in a uniform stream. The high flame temperatures possible with pulverized coal properly burned has suggested that the regenerators in the open-hearth furnace might be replaced entirely with waste heat boilers, which are of course a much more efficient means of reclaiming waste heat than firebrick used as regenerators. In any event, the use of coal in this way, which injects its entire ash content into the open-hearth furnace, and a large part of it into the passages and checkers beyond the furnace, is going to require a modified design of regenerator. On account of the recent adoption of pulverized coal in steel making, this detail has not been thoroughly worked out.

Natural Gas

Natural gas for the making of steel, as indeed for all other purposes for which fuel is used, is ideal. Its cleanliness, high heat value per unit of volume, freedom from non-combustible and injurious elements, ease of transportation and fixed character, makes it the most desirable of all the fuels furnished by nature. The only place where it is found in sufficient quantities to be available for steel making is in western Pennsylvania and West Virginia fields. Its average composition and heat value are about as follows:

	Per cent.
Carbon Monoxide (CO)	1.493
Methane (CH_4)	93.96
Ethylene (C_2H_4)	1.447
Nitrogen (N_2)	3.10
	100.00
B. T. U. per cubic foot.....1,048	

On account of its small volume and weight per unit of heat it is not necessary to regenerate it, nor is it possible to do so on account of its composition, as it breaks down at comparatively low temperatures.

The method of burning in the open-hearth furnace is simply to carry the gas pipe through the bulkhead of the furnace and bring the gas into intimate contact with the regenerated air. Temperatures are thus attained fully ample for the requirements of steel-making. The lack of the necessity for regenerating the fuel gas leaves the entire regenerator space available for preheating the air.

The quantity of natural gas necessary for the production of a ton of steel ingots by the open-hearth process is about 5,500 cubic feet, having a heat value of 5,766,750 British thermal units. It may vary somewhat above or below this figure, depending upon the size and construction of the furnace and the care with which it is used by those in charge. In the making of steel, and in fact in most metallurgical processes, there is much room for economy, the necessity for which becomes more apparent as the permanency of the supply is threatened. Reliable figures covering the actual heat loss, etc., in an open-hearth furnace using natural gas are available.

In the summary which it is intended to make of the question of furnace efficiencies the results obtained from a furnace working on natural gas will be used. As is the case with tar and by-product coke-oven gas, the limitations as to the use of natural gas in steel making are also found in the supply. In the Pittsburgh district, where natural gas has been used most for the making of steel, it is hardly likely that new open-hearth furnaces will be constructed without some kind of coal-burning equipment; and even in the other requirements of steel making, such as ingot heating and reheating, it will also be found desirable to follow along these lines. Probably within a period of 5 to 10 years, unless unanticipated discoveries are made of natural gas supplies in the way of larger and more numerous wells, this fuel will be confined to domestic purposes and the smaller manufacturing operations.

Up to this point nothing has been said about the possibilities of better furnace design in order that fuels may be used more efficiently in the furnace. The basis of any improvement along these lines must necessarily be a thorough study of existing practice and a knowledge of the kind and extent of preventable losses. Realizing the lack of specific information in this respect, a thorough test has been carried out on a 50-ton furnace using natural gas, the test having been made on a furnace using this fuel on account of the ease with which the fuel could be measured and the avoidance of inaccuracy through having to take into consideration fuel losses external to the furnace, as is the case in the use of producer gas.

Table II.

HEAT VALUES OF BITUMINOUS COALS.

	Per cent fixed carbon.	Per cent volatile.	Per cent moisture.	Per cent ash.	B. T. U. per pound.
Penna., W. Va. and Ohio (High volatile)	50-60	30-40	1-1½	6-10	13,700-14,200
Penna., W. Va. and Ohio (Low volatile)	70-75	15-20	½-1	5-7	14,500-15,000
Alabama and Tennessee.....	45-50	30-35	1-5	10-12	12,000-13,000
Indiana and Illinois	40-50	30-40	5-8	10-12	11,000-12,000
Wyoming and Colorado (Bituminous)	35-40	35-40	2-4	20-25	10,000-10,300
Wyoming and Colorado (Lignite)	40-45	35-40	13-17	4-8	10,300-10,700

Test Made

Beginning with Sept. 27, 1911, accurate measurements were taken of the quantities and temperatures entering into the making of 469 heats, occupying a total of 233 days, 2.78 hours. The results averaged for the 469 heats are given in Table III, and shows that 12.95 per cent of the total heat available was found in the steel at tapping time; 1.79 per cent was in

the tapping slag; 1.23 per cent in the pit slag; 1.57 per cent and 0.97 per cent were used in reducing the ore and decomposing the limestone, respectively; 30 per cent was absorbed and returned to the furnace by the regenerators; 32.02 per cent was carried up the stack, leaving 19.47 per cent for radiation, conduction and unaccounted for. The thermal efficiency of the furnace and regenerators combined, based on the ratio of the first six items enumerated, to the total heat supplied, was 48.5 per cent. The thermal efficiency of the regenerators was 38.3 per cent measured by the ratio of the heat delivered to the incoming air to the total heat in the waste gases leaving the bridge wall.

Losses Vary

An examination of the figures in Table III indicates that rediation, conduction and stock losses can be controlled by design and operation.

Radiation and conduction losses vary greatly with the construction of the furnace. Thicker walls will prevent the escape of the heat of the furnace, but at the same time will probably result in higher cost of upkeep due to more rapid deterioration while the walls are still thick. The choice between this and the greater fuel loss, due to thinner walls, involves a considerable amount of judgment. It is impossible to determine without much experiment just where the economical point lies, but it would appear from the construction of a great many open-hearth furnaces that a large amount of heat might be saved by thicker and better walls, particularly around the bulkheads and ends of the furnace.

The following shows the average analyses by volume of the stack gases from 469 heats:

Constituents.	Per cent.
CO_2	5.31
O_2	13.05
CO	00.00
N_2	81.64
	100.00

A study of this analysis will show that there is about two and one-half times as much air present in the stack as is needed theoretically for combustion of the gas. This large excess of air reduces the flame temperature, and the water carried into the furnace as moisture in the air also has a material affect on the temperature. The average flame temperature with the 15 per cent excess air was 3,074 degrees. By approaching the theoretical amount of air required higher temperatures might be obtained, thereby reducing the volume of waste gases and the time required per heat, and so lead to fuel economy. To reduce stack losses the temperature and weight per hour of the waste gases must be reduced, and to do this it is absolutely essential to have control of the air supply. This control cannot be had by throttling the air at the remotest source of supply, namely, the air inlet valves, as the furnace is not air-tight and the stack simply supplies its demand through the slag hole, around the door frames and other openings, this leakage not only entering without pre-heating, but coming in where least needed for combustion. Theoretically, one cubic foot of gas requires 9.2 cubic feet of air for complete combustion. The air meters measured in this experiment on an average 13 cubic feet of air through the checkers for every foot of gas consumed and the leakage through the furnace was 10 cubic feet, or 77 per cent excess above that measured.

Effect of Reversal Intervals

A chart was employed which showed the heating and cooling effects of the waste gases and air as measured at the furnace or *hot* end of the regenerator chamber and at the stack or *cool* end of the regenerator chamber. It showed that for 20 minute intervals, the gas at the hot end of the regenerator works between 1,675 degrees Fahr. at the beginning of the heating period and 2,125 degrees Fahr. after the gases have been passing through the regenerators for 20 minutes, while at the cold end of the regenerator chamber the gases have a temperature of 645 degrees Fahr. at the beginning of the heating period and rise to 1,415 degrees at the end of the 20-minute period. The point of greatest significance shown by the curves plotted, was that after the gases have passed for 10 minutes further absorption by the checkers is only obtained at the expense of comparatively high stack temperatures, the conclusion in general from this being that reversals should be of as short an interval as possible consistent with the maintenance of temperatures sufficient for the purposes of the furnace. As a matter of fact, reversals on this particular furnace have been cut down to 15 minutes, with an increase in fuel economy and reduced repairs on the furnace. The temperatures not working over so great a range lead to less wear and tear on the brickwork of the furnace.

One other method of recovering the heat in the stack gases offers it-

Table III.

HEAT BALANCE AS DETERMINED FROM THE AVERAGE OF 469 OPEN-HEARTH HEATS FROM THE SAME FURNACE.
(AVERAGE TONS OF STEEL PER HEAT, 53.6.)

Total Heat Received,[1] With Source.

From	B. T. U. per heat.	B. T. U. per ton.	Per cent.
1.—Heat of combustion, natural gas	307,707,489	5,740,800	53.91
2.—Heat carried in by regenerated air	171,153,544	3,193,200	30.00
3.—Heat of oxidation of bath	59,652,554	1,112,900	10.45
4.—Sensible heat of hot metal charge	30,204,480	563,500	5.28
5.—Heat of formation of slag	1,938,792	36,200	.34
6.—Sensible heat in natural gas	108,719	2,000	.02
Totals	570,765,578	10,648,600	100.00

Distribution of Heat.[1]

To	B. T. U. per heat.	B. T. U. per ton.	Per cent.
1.—Heat in steel at tapping time	73,942,900	1,379,500	12.95
2.—Returned to furnaces by regenerators[2]	171,153,544	3,193,200	30.00
3.—Sensible heat in tapping slag	10,259,083	191,400	1.79
4.—Sensible heat in pit slag	7,017,958	130,900	1.23
5.—Reduction of ore	8,969,180	167,300	1.57
6.—Decomposition of limestone	5,544,694	103,500	.97
7.—Waste gases entering stack	182,776,632	3,410,000	32.02
8.—Radiation, conduction and unaccounted for	111,101,587	2,072,800	19.47
	570,765,578	10,648,600	100.00

			Per cent.
Thermal efficiency of furnace, including regenerators	Items 1 to 6, inclusive, in distribution above / Total heat	276,887,359 / 570,765,578	= 48.5
Thermal efficiency of regenerators	B. T. U. returned to furnace by regenerators / B. T. U. in waste gases at bridge wall	171,153,544 / 446,516,724	= 38.3

[1]All heat values calculated above 62 degrees Fahr.
[2]Regenerators include all passages and checker-work between bridge wall and stack.

self to the engineer, and that is the use of waste heat boilers beyond the checkers, and this method is being used with a high degree of success. One of its disadvantages is the large capacity of boiler required for a given recovery on account of the comparatively low temperatures of the gases. A 75-ton open-hearth furnace must be fitted with a 400-horsepower boiler in order that 200 to 250 horsepower of steam may be developed. Notwithstanding this and other disadvantages, an installation of open-hearth waste heat boilers will give a good return on the investment, particularly in localities where fuel prices are high.

Recent developments of the Duplex process have shown a reported fuel consumption of 150 to 180 pounds of coal per ton of steel, which might be expected from the high thermal efficiency of the Bessemer part of the process. It is highly probable that, if these results are borne out by continued practice, the most economical consumption in steel making will be obtained by the use of this process, in which the open-hearth portion will be carried on with the most economical method of burning fuels.

Discussion by William G. Kranz[1]

As the National Malleable Castings Co., Sharon, Pa., is probably the pioneer in the application of pulverized fuel to the open-hearth furnace, a short history of the experiments will probably be of interest.

When the price of fuel oil, which we were using in the open-hearth exclusively, began to gradually and persistently advance, we were confronted with the necessity of employing some other and cheaper fuel. The furnaces that had formerly been operated with producers had been increased in capacity so that the producers, flues, etc., were too small, rendering the old equipment practically worthless. New producer equipment would have involved a large expenditure of money, so we directed our attention to pulverized coal.

Practically all of the steel makers interviewed on the subject were very apprehensive as to the bad effects that might accrue from the siliceous materials in the ash. One quite prominent engineer replied to an inquiry on the subject: "The ash from the coal is blown into the slag and tapped off with it," which, if occurred, would make its use for the basic furnace prohibitive. We nevertheless felt that with extremely fine pulverization the resultant ash would be so light that it would be carried by the draft into the checkers, and possibly a considerable proportion out of the stack. Our assumptions in this regard were substantiated by actual trials, which we had decided to make.

Temporary apparatus was installed after considerable investigation. The pulverized coal was taken in tote boxes to the screw conveyors which feed the coal into the burners. The burners were placed into the end walls of the furnace, as in the case of oil or tar burning.

In order that the experiments would not interfere too seriously with the regular operations of the plant, the trials were made on Sunday evenings. Slag analyses were made at intervals during and at the end of the refining of the metal and proved to be normal, showing that very little of the ash was deposited in the slag.

A second heat was made, with similar results. We then decided to discontinue the experiments and proceed to install permanent apparatus. The first furnace was equipped and has since made several hundred heats, operating practically continuously, using different grades of coal, modifications of the burners, and changes in checker construction.

Conclusions

There are three essential requisites in the use of pulverized fuel.

First.—The fuel must be very fine; and in our judgment, better economy will result if carried to a greater degree of fineness than suggested in Mr. Whigham's paper.

Second.—The fuel must be dried, expelling all moisture possible.

Third.—Adequate means for removing ash from the checkers and flues must be provided.

There are no metallurgical difficulties involved in the use of pulverized fuel except the increase of the sulphur in the metal, and that is directly in proportion to the amount of the element in the fuel. The increase in sulphur, due to the fuel, is not any greater, however, than that in the case of producers which use the same fuel.

We feel justified in the belief that the quantity of fuel used per ton of melt will be less than that of the best producer practice.

[1]Manager, National Malleable Castings Co., Sharon, Pa.

Book Reviews

Patternmaking, by F. W. Barrows; 350 pages, 170 illustrations, published by the Norman W. Henley Publishing Co., New York City, and furnished by The Iron Trade Review, Cleveland, for $2, postpaid.

The second edition of this work, which has been revised and enlarged, is a comprehensive and practical treatise on the subject of patternmaking, illustrating this work in both wood and metal, and contains definite instructions on the use of plaster of Paris for making models. Specific and detailed descriptions of the materials used by patternmakers, their tools, etc., are included and many examples of pattern work, each fully illustrated and explained in considerable detail, are given. Considerable space is devoted to the making of patterns for use on molding machines, including stripping plate and stool plate work, etc. The book closes with an original and practical method for the inventory and valuation of patterns.

Scientific American Reference Book, 608 pages, 1,000 illustrations, published by Munn & Co., Inc., New York City, and furnished by The Iron Trade Review, Cleveland, for $1.50 postpaid.

In this work are gathered statistics and information concerning the inventions and processes which are vital factors in our material and scientific progress. One part of the book is devoted to statistical information and chapters are devoted to population and social statistics, data regarding mines and quarries, manufactures, commerce, merchant marine, railroads, facts about the Panama canal, telegraphs and cables, wireless telegraphy, telephone statistics of the world, patents, trade marks and copyrights, and the scientific information includes chapters on chemistry, astronomy and time, machine elements and mechanical movements, etc. The compilation is exceedingly interesting and will prove of value as a statistical reference work.

The Mumford Molding Machine Co., New York City, no longer is under the management or control of the Vulcan Engineering Sales Co., Chicago. Officers of the Mumford company have been elected as follows: Philetus W. Gates, president; E. H. Mumford, vice president and general manager; F. K. Stockton, secretary and treasurer, and James T. Lee, sales manager.

Machines Grouped For Sequence Of Operations[1]

How Manufacturing in a Large Automobile Plant is Facilitated by Placing the Tools in Accordance with the Operation to be Performed

By Oscar C. Bornholt

In any manufacturing enterprise the cost of production is of the utmost importance, and a great deal of money can be wasted if proper facilities are not provided. Even though a plant has the very latest and most efficient machines and fixtures, money can be unnecessarily spent in trucking. Trucking in the machine shop is always looked upon as an unnecessary expense, and yet many plants have a large trucking expense. This involves the question whether the manufacturing machines in a machine shop should be laid out in accordance with the sequence of operation, or whether they should be grouped according to the class of operation requiring like machines, such as placing together all milling machines, all drill presses, etc.

I will endeavor to show that the arranging of machines according to sequence of operation, as practiced by the Ford Motor Co., Detroit, has a great advantage over the classified machine grouping. In the former case the operations on any part to be manufactured can be outlined according to the best advantage in manufacturing the part. It might be well, on account of the nature of the part to be manufactured, to have a milling operation first, then drilling, then milling, and it would not make any difference what sort of machine followed on each operation. But if the latter arrangement of grouping were decided upon, the operations would have to be arranged so that like operations on the same part would follow each other. For illustration, a milling operation should not come between two drilling operations so that the part would have to be trucked to the drill department first, then to the milling department, and then back to the drill department. Trucking is expensive and all its labor is non-productive.

Trucking Costs Heavy

The trucking item is immense in a large plant when the machines are arranged according to class, as all parts have to be trucked many times before they are finished. When machines are placed according to sequence of operation there is no trucking of parts after the first operation is started, as each operator lays the part down in such a place and manner as to allow the next operator to pick it up and perform his operation, and so on. When finished, the part goes either to the finished stock room or assembling department.

At the Ford plant all parts of a unit assembly are made on machines that are so laid out that the last operations bring them near together. This applies, of course, only to the large pieces, but all parts of a unit are made in one department under a foreman.

Automatic screw machine parts are made in an automatic screw machine department where one man runs several machines. There would be no object or advantage in placing automatic machines among semi-automatic and manual operative machines. It is well understood that there are many operations that require more than one machine, but they are placed to draw from the one machine doing the previous operation. This gives the effect of the whole operation being done on one machine.

Table 1.

OPERATIONS ON THE UNIVERSAL JOINT KNUCKLE.

Operation.	Work.	Machines required.	Capacity, per hr.
First	Mill square end.....	2 Millers	40
Second	Turn to size, 3⅛ in. diameter.	1 Lathe	80
Third	Turn trunnion ends.....	2 Duplex drills	40
Fourth	Mill ends, shoulder clearances.	2 Millers	60
Fifth	File	Bench for filing	..
Sixth	Harden	Furnace in the hardening room in the machine shop; knuckle to be returned to assemble	..

The operations have to be gone over carefully to ascertain the capacity either by previous records or by good judgment. In many operations more than one machine will be required, but there will not be work enough for two. Although the first cost may seem high it is a great saving to have a machine for every operation and enough of them.

The carbonizing and hardening operations are awkward to have in the machine shop, but at the Ford plant a cyaniding and hardening department is placed in the middle of the machine shop. It is glassed-in and thoroughly ventilated with a separate system to carry off the fumes from the cyanide pots. All parts to be cyanided and hardened are led up to this department and thus trucking to a separately located building is avoided. This would amount to several hundred tons of material a day.

On account of the great amount of heat generated, the heat-treating and carbonizing departments had to be placed in a separate building where the walls could be opened 60 per cent. Brazing is done in the machine shop, just before the parts reach the assembling department. All shop furnaces are operated with low-pressure air and city gas.

As an illustration of unit production, I will take the universal joint which has only four pieces and four rivets. Assuming a production of 80 pieces per hour is required, it would take

80 universal joint knuckles (male)
80 universal joint knuckles (female)
160 universal joint knuckle rings (halves)
320 rivets

The universal joint knuckle (male) has six operations, as given in Table 1.

The operations on the universal joint knuckle (female) are similar. The rings are broached, and then ground on a disc grinder, which is placed in the machine shop. The grinder is equipped with a dust exhauster and collector so that no emery dust flies to other machines.

After all the parts are completed, they are led up to an assembler who also rivets them. They are then inspected

[1]From the Journal of American Society of Mechanical Engineers.

and sent to the finished stock room or the assembling department, usually the latter, since the production of the whole shop must be balanced.

At the Ford plant, the cylinders are trucked from the foundry to the border of the aisle, down which are located the machines which perform the first operation. They are light enough to be carried by the operators to their machines while the latter are making cuts. The cylinders move to each successive machine until they land in the assembling department which borders the cylinder department. All cast iron parts are made in the same way; some of the small parts have to be trucked to the assembling department, but in rare cases only. The trucking that is done at the Ford plant is taken care of by many two-ton monorail traveling hoists, operated by electricity and forming a small railway system.

The accompanying illustration graphically shows the first few operations in the cylinder departments. The various operations follow:

First.—Drill, tap and plug three cored holes.

Second.—Spot face and inspect. This is one of the most important operations on the cylinder, since it detects any defect that might have occurred in the foundry. It also finishes spots to enable the placing of the cylinder in the jigs quickly and accurately. Many cylinders are thus saved in this jig because it is arranged to adjust the cylinder to insure its being finished all over.

Third.—Mill bottom.

Fourth.—Drill six main bearing bolt holes and ream two of the holes for use in gaging or jigging. The drilling is done in a six-spindle inverted drill press and the two holes are reamed in a single spindle drill press.

Fifth.—Mill top and sides.

Sixth.—Bore cylinder barrel.

Seventh.—Water test.

Eighth.—Mill ends of cylinder.

Ninth.—Finish ream barrel.

Tenth.—Drill valve seat holes.

Eleventh.—Drill and ream valve stem holes, etc., until the cylinder reaches the assembling department.

It may be of interest to compare the two ways of arranging machines for manufacturing by using the cylinder operations of various kinds. In placing the machines according to operations it is necessary only to truck the cylinder to the first operation and after the last, because it is quite necessary to stock a few cylinders ahead of assembling. If the cylinders were to be machined in departments consisting of like machines, it would be necessary to truck to and from each department. Considering 1,000 cylinders a day and the cylinders weighing above 80 pounds each, it would total 80,000 pounds to each department.

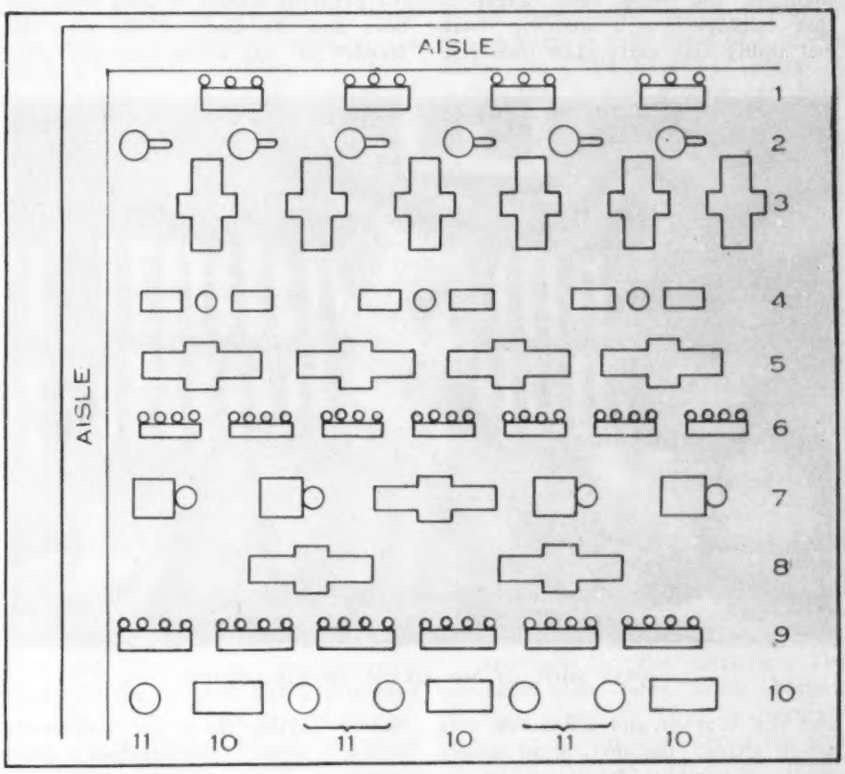
Grouping the operations on the cylinder to see how many times it is handled in the various departments, there are drilling, milling, lathe, testing, tapping, babbitting, back to drilling and grinding. It would be conservative to estimate that the cylinder would have to be trucked about 12 times. On account of some operations it would have to return to a department in which it had already been, and would, therefore, be handled more times than there are departments.

Each handling will amount to 80,000 pounds, or 40 tons, and 12 handlings will amount to 480 tons a day, while the total number of feet of movement for each cylinder will be at least 500. This makes 480 tons traveling 500 feet at the probable rate of 180 feet a minute, which is about the gait of a man trucking. Assuming a man can truck 960 pounds, or 12 cylinders, at the above rate of travel, and figuring the necessary time for loading and unloading as 10 minutes, it would require a force of 24 men with trucks to handle the 1,000 cylinders per 10 hours.

While it may be claimed that the cylinder is especially adaptable to manufacture with machines placed in accordance with the sequence of operations, small forgings can also be produced in quantities much cheaper in the machine shop when the machines are placed in this way.

The machining of connecting rods shows how this system is applied where comparatively small forgings are used. These are brought in from the forging shops, and begin their passage down the row of machines which are arranged for the various operations. Nearly all of the machining operations consist of drilling, and the rods pass from one machine to the next, each being fitted to perform a specific operation.

Iron ore produced in India was valued at $48,500 in 1910, increasing to $243,000 in 1912.



SEQUENCE ARRANGEMENT OF MACHINES IN THE CYLINDER DEPARTMENT

Large Dipper Dredges

The Bucyrus Co., Milwaukee, recently has completed two dipper dredges for the Panama canal. They are said to be the largest ever constructed and are provided with horizontal, twin-tandem compound engines with cylinders 16 and 28 inches in diameter by 24-inch stroke. The dippers have a normal capacity of 15 cubic yards and are designed to work in water 50 feet deep. The dredge hulls are steel, 144 feet long and 44 feet beam with a draft of 16½ feet. They are being erected at Newburgh, N. Y., and will be towed to the Isthmus.

Business Men Must Organize for Real Work

To Solve Pressing Problems—Address of Richard F. Grant Before the Cleveland Chamber of Commerce—Reasonable Legislation Should be Initiated

At a noon meeting and luncheon of the Cleveland Chamber of Commerce on Dec. 9, Richard F. Grant, counsel for M. A. Hanna & Co. and director of the Ohio Equity Association, spoke on "The Initiative and Referendum and the Business Man." Mr. Grant reviewed at length three laws passed at the last session of the Ohio legislature, the Green act, which compels all employers having in service five or more workmen to insure them in the state fund, excepting that employers with sufficient financial ability may carry their own risk; and the Warnes and Kilpatrick acts, which change the method of assessment of property for taxation purposes.

SNAP SHOT OF MR. GRANT IN HIS OFFICE

Mr. Grant explained what many employers considered serious objections to the Green law. He also described what he believed to be the weaknesses of the other two acts. He then related how the Ohio Equity Association endeavored to have the three laws rejected by the referendum and to initiate a new compensation law. Every member of the association is a believer in the principle of workmen's compensation and a bill was prepared which enables the employer to insure his risk in a state fund, or with a regular insurance company, or in a mutual company, or to carry his own risk in secured cases. Funds were subscribed by members of the association and the work began. Liberal support was given the association by many prominent business men throughout the state. The association was violently attacked by politicians. "Some solicitors got into the employ of the association, in some cases," said Mr. Grant, "by means which I cannot here relate, and deliberately prepared and turned in fraudulent petitions. Surreptitious names were signed on the petitions, names of dead men, minors and the like. These men defrauded no one worse than the association paying them for supposedly honest work. Nevertheless great newspaper publicity was given to all frauds discovered and the association was apparently in the mire."

To replace the possible frauds on the Green law petition, 35,000 additional signatures were later procured. Then a hearing was conducted by the secretary of state and all the petitions filed were thrown out. The association is now at work gathering signatures on its initiative compensation measure and will file an entirely new petition.

"In the final analysis," said Mr. Grant, "the association stands convicted of the heinous offense of trying to give the people an opportunity to understand and vote on three important measures."

Mr. Grant then suggested that legislation is needed to safeguard the referendum. He said he believed that it should be a punishable offense deliberately to write a fictitious name on a petition, or for any elective or appointive officer to attempt to prevent a referendum. When referendum petitions are challenged, a hearing should be had before a special master, the decision to be reviewed by the supreme court. No petition should be declared invalid unless at least 5 per cent of the signatures are shown to be fraudulent. Paid solicitors should be permitted. Otherwise the referendum will be available only to labor unions, both sides of the liquor question and in some cases a political party. In conclusion, Mr. Grant said:

"A large measure of legislation today involves the business man. He complains frequently to his fellow business man that he and his goods are marked for legislative slaughter. The national congress this year has lessened his profits by tariff reduction and has taken a part of the remaining profits under the income tax. Legislation has been enacted or proposed covering maximum hours of labor, minimum wages, protection of women in employment, compensation for injuries, mothers' pensions, old age pensions, sick benefits for workmen, classification of property for taxation, factory inspection, workshop laws, safety appliances, welfare work, blue sky laws affecting issuance of stock and securities, coal screen bills, specifying dates of payment to men, building codes, etc. Many state boards of all kinds have been created to make rules and regulations for business operations at great expense to tax payers. The business man is required to make an almost numberless list of reports covering income, listing of property, accidents, capital stock, securities, etc. If his business assumes any proportions, he is confronted with laws, both state and national, regulating commerce and combinations. If he is investing in public utilities, he is confronted with municipal regulations and public ownership. He complains bitterly, but does nothing and suggests nothing to better the situation. To the man doing business in a small way on a small margin of profit, the situation threatens to become serious

"I think I may fairly say that until the last few years business men generally have taken an attitude of opposition to all legislation involving their business in any way. They have contested from every possible angle the constitutionality of such laws. The lobby has been frequently, and often improperly, used, and in rare cases even bribery has been resorted to. Bribes have at times been exacted by unscrupulous legislators in a manner closely resembling blackmail. Some business men have in isolated cases felt that they must respond to these legislators for their own protection, and with some show of right. The business man has either approached the subject from these angles or he has remained passive. This has been his solution of what seemed like an oppressive and unfair situation.

"The laboring man has complained of his wages and hours of labor, of his inability to get satisfactory settlement of claims for injury, of his surroundings and a vast number of other matters, and his complaints have been heard and legislation has resulted.

"A fair analysis of the situation will be shown in practically every case that a real grievance has existed requiring some form of correction, but the cure has often been unnecessarily severe. The Green law is an apt illustration. Liability companies have in many cases forced unfair settlements with injured men. The business man is the underlying cause, as he has demanded the lowest possible rates and competition has done the rest. And so in the Green law the liability company is legislated out of business, even though these companies under a proper compensation act may be a valuable asset, as I have outlined. A vast army of men in the liability field who have spent a lifetime in building up a business are legislated out of a livelihood, and unnecessarily. Proper compensation laws have become an economic necessity.

Public Ownership

"Another example:—Many advocates of public ownership believe that its greatest use is as a club and have in their hearts actually opposed its consummation. They are somewhat nonplused with the thought that it may in some cases become a reality. When realized, a good political slogan will be lost and the plan will then have to justify itself on its merits, which is a somewhat difficult task. The real foundation behind the movement will, in many cases, be found to be real wrongs which have not been voluntarily recognized and redressed. Some well applied forethought would have cooled some of this agitation, but not necessarily all of it, as many advocates really believe in the principles involved.

"What has the business man been doing while all this has been in progress and what is he going to do about it?

"I believe that the time has come when the business man must get at least one eye off the balance sheet and cast that eye and his best thought in the direction of the welfare of his employes, and many employers are doing this. Government reports on voluntary welfare work show that this spirit exists widely in our own city. Proposed legislation should be carefully and scientifically studied and if it aims at the correction of the real evil, it should be assisted and not opposed. No business man would sign a contract involving his business unless he had an opportunity of reviewing it himself and incorporating his own ideas in it. If the other party to the contract had a grievance against this man and understood that any contract which he devised would be signed without review, I imagine that the contract would be rather one-sided and needlessly drastic to accomplish the intent of the agreement. But this is what has happened in business legislation. The business man has stood aloof in a spirit of opposition and the other side has drawn the contract. The business man should sit in and have a hand in drawing the legislation. He should even initiate legislation which he knows is needed and proper.

Associations of Protest

"Business men have formed numerous associations for their protection. These associations have officers and a secretary, an office, and perhaps publishes some sort of a journal, largely of protest. Committees have appeared before the legislature and some real good has been done. However, as I view the case, there has been largely a spirit of useless opposition and not an earnest effort at solution of the problem. The business man has not conceded the necessity for the legislation and given his best thought to the initiation of it. Governor Cox has stated that the business men should not now complain of the Green law, as they offered no substitute measure. Committees went to Columbus and protested against the Green law, but they offered nothing in its place, although it is perfectly apparent that the subject matter is a proper one for legislative treatment. It is equally clear to me that the business men of Ohio should have started four or five years ago to prepare their form of compensation act. We have had years of notice that it was coming and have literally been asleep at the switch.

"And now to the solution. The business man must inject himself into the situation. These matters are becoming serious elements in the cost of doing business. He must organize. He must have experts examine the laws and conditions in other states and countries. He must anticipate needed reforms and find the proper economical remedy. He must co-operate and not oppose proper legislation. He must recognize improper conditions. Above all, he must be open minded and fair.

"Such an organization should be amply supplied with funds so that the work may be scientifically and carefully done. It should have an exchange of ideas with labor and other organizations. It should help them in legitimate matters. I agree that it will take time to get the confidence of the laboring man in such matters, but it can be done. I have found la-

Striking Sentences From Mr. Grant's Address

"I believe that the time has come when the business man must get at least one eye off the balance sheet and cast that eye and his best thought in the direction of the welfare of his employes. Many employers are doing this."

"There has been largely a spirit of useless opposition and not an earnest effort at solution of the problem. The business man has not conceded the necessity of the legislation and given his best thought to the initiation of it."

"The business man must inject himself into the situation. He must organize. He must anticipate needed reforms and find the proper economical remedy. He must co-operate and not oppose proper legislation. He must recognize improper conditions. Above all, he must be open-minded and fair."

bor organizations generally fair minded if they believe you are on the square. They are naturally suspicious of the employer's efforts and perhaps some past experiences warrant the feeling. However, their confidence can be gained by fair, open treatment.

Only One Object

"Such an organization should have but one object, and that is legislation. It should feel the pulse of the times and know what other people are thinking about. It should be humane. It should have no snap judgments. It must have reason and sound argument for its every stand. It must be non-partisan and in no sense political. It must favor the candidacy of no man, nor be moved by the grievances of any single class of men unless a basic principle is involved.

"Such an organization must expect to be misrepresented and misunderstood, misquoted and somewhat maligned, but by using perseverance and real punch it can survive and become a lasting and real institution for great good.

"The referendum should be sparingly used. Business men generally abhor publicity and above all a political embroil. These will be deterring influences. The initiative in the legal sense will be seldom used by the business man. In the broad sense of helping formulate needed legislation, the initiative should be and will be much used. I believe that many discrepancies in and objections to our new constitution and to the bills I have reviewed would not now exist if the business interests had studied the situation and had a hand in drafting these measures.

Labor Legislation

"Ahead we can see a large amount of labor legislation, much of which is meritorious in principle, serious questions involving the conservation of our credit, municipal, state and national, taxation questions, extension of civil service, economies in administration, legislation affecting business expansion, settlements of labor disputes and the like. The same mental effort which has made for economy and success in business enterprises can well be turned to the successful solution of these problems. Herein is great hope for the best type of legislation. The initiative and referendum provided for by our constitution will be seldom, if ever, used, but in the preparation of legislation along studied and scientific lines the initiative in its larger sense will be and should be endorsed and supported by the business men collectively.

"A great amount of damage in present-day legislation is due to the fact that the measures involved are part of a party program, railroaded through without sufficient consideration in preparation, or discussion or argument, either in committee or on the floor. The great mass of legislation at any session renders impossible full consideration of all measures.

Aid Legislators

"This situation can be largely obviated if the business men will only anticipate the legislation and have their ideas thoroughly crystallized and presented in tangible form. Legislatures are not deaf to reason, neither can they be expected to properly handle the vast mass of legislation presented without the clearly expressed ideas of men on the outside whose years of experience specially qualify them to point out the evils and the remedies. Delegations of business men often appear before legislative committees and in an argumentive sort of way express a variety of haphazard and often conflicting opinions. Such information is often misleading, confusing and not based on an exhaustive study of the subject. In lieu of these delegations, the business men's view should be embodied in the draft of a law. It should be presented and argued by some one man thoroughly conversant with the subject and well grounded in the defense of the proposed measure. In addition, the proposed bill should represent the united view of the business interests involved and it should be presented under their sanction and be clothed with authority to represent them. It should not be merely the view of one man or a few men. Party platforms, the press, demands of labor, the slogans of the politicians and apparent reform movements will point the avenues for consideration.

Have Plans Ready

"Mr. Wheeler, president of the National Chamber of Commerce, in his address in this hall three weeks ago urged upon the Chambers of Commerce of the United States the necessity of anticipating national legislation involving the present laws relating to combinations, commerce and trade restraint. He urged them to study the situation and be ready with their plans which will in the least measure disturb business conditions and which will at the same time accomplish needed changes. This is surely sound doctrine and I am constrained to urge upon business men of Ohio the same plan with reference to our state legislation. We are vitally interested in these state matters, as they are entering into the cost of doing business in Ohio. If we are going to maintain a position of equality with other industrial states, we must not be legislated into a position of disadvantage by our own people.

"Herein lies an opportunity for the exercise of the best thought of our business people, their patriotism and loyalty to a free government."

Reducing Power Plant Waste by Metering

By S Rice

In the operation of the modern power plants auxiliary to mills, finishing plants and machinery building establishments, there is no feature of greater importance than the economical handling and control of the water, air, steam or gas, which are primary elements in the generation of energy. This in turn depends, however, on accurate measurement, recording and comparison of the rates of consumption. One result of the attention given this subject within the past few years has been the development of flow meters, a recently designed type of which is illustrated herewith. This can be used not only as a test instrument, but as a stationary meter for the continuous measurement of liquids, gases or vapors.

The body of the flow meter consists of an iron casting cored out so as to form one leg of a U-tube and a reservoir for mercury, the outer leg of the U-tube being formed by a pipe which opens into the reservoir. The pressure on the surface of the mercury varies with the rate of flow of the fluid being measured.

A float rests on the surface of the column of mercury in the body of the meter and rises and falls with the corresponding changes in its elevation.

The float is geared by rack and pinion to a horizontal shaft which carries a permanent U-shaped magnet. The poles of this magnet face a copper cap, which closes an opening into the meter body. The remaining parts of the meter mechanism are mounted on the outside of the cap. A shaft, parallel to the one on which the magnet inside the body is mounted, carries a smaller magnet whose poles are opposite those of the larger magnet, this arrangement serving to transmit motion through the cap without piercing it with a shaft and thus the difficulty of packing such an entrance to prevent leakage is avoided. As the poles facing one another are of opposite polarity, the magnetic flux binds them together so that a movement of the magnet inside the body involves a corresponding movement of the one outside, the latter actuating the indicating needle and the recording pen, through suitable mechanism.

Use of Nozzle Plug

The pressure which moves the column of mercury in the U-tube is obtained, for pipes 2 inches and greater in diameter, by inserting a modified form of Pitot tube termed a nozzle plug directly into the pipe line. This can be done without disturbing the piping, except where it is desired to increase the rate of flow at the point of metering, in which case a special pipe reducer is provided. This reducer is made of brass and has a long throat with rounded entrance terminating in a flange. The flange is inserted between the pipe flanges and is

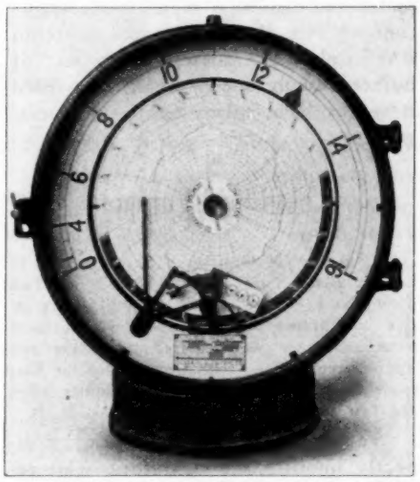


FIG. 1—INDICATING, RECORDING, INTEGRATING FLOW METER WITHOUT LAMP

held in place in the same manner as a gasket. A special nozzle plug is supplied with the pipe reducer.

The nozzle plug is a tube with two separate conduits in it, each conduit having a set of openings, the two sets being on diametrically opposite sides of the tube. Those on the side of the tube facing the flow are called the *leading openings*, and those on the opposite side are called the *trailing openings*.

The flow against the leading openings in the nozzle plug sets up a pressure in the leading conduit which equals the static pressure plus a pressure due to the velocity head. The flow past the trailing openings causes a suction, which lowers the pressure in the trailing conduit. As these two conduits are connected to the U-tube by ¼-inch pipes, the column of mercury is affected by this unbalanced pressure, causing a movement of the float. The leading set of openings in the nozzle plug extends approximately across the pipe diametrically, so as to make the velocity pressure transmitted to the meter the mean velocity pressure rather than that at a single point in the pipe.

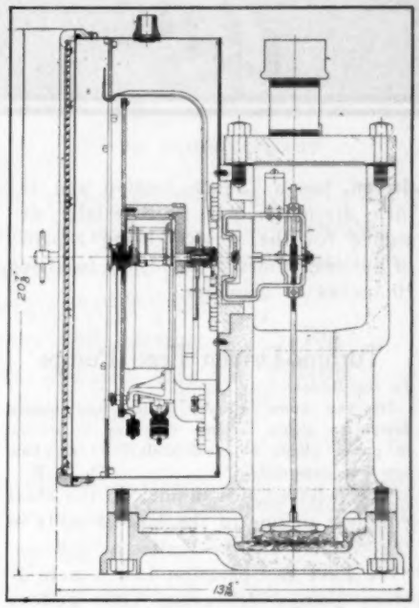


FIG. 2—CROSS-SECTION OF FLOW METER

The chart on which the pen-records are made is rotated by clock work. The pen sweeps the chart radially and the resulting curve shows the rate of flow at any time during the chart cycle.

The integrating device consists of a stationary flow rate planimeter driven by the chart paper. The angular position of the planimeter wheel is determined by a cam connected to the shaft of the recording pen and moving with this pen. The planimeter dials read in arbitrary units, which, multiplied by a contact furnished with the meter, gives the flow in units.

For pipes less than 2 inches in diameter, an orifice tube, which is a brass pipe tapered internally from both ends so as to form a restricted opening at the middle of the tube, is provided, and it must be incorporated in the pipe line. One leg of the U-tube is connected to the orifice tube near its end and the other leg to its middle point, where the greater velocity at the orifice will give a reduced pressure in the pipe leading to the U-tube.

Meter Types

To meet the requirements of different classes of service and various local conditions, this meter, which is a product of the General Electric Co., Schenectady, N. Y., can be made in four different ways: First, as a recording or curvedrawing instrument; second, with both indicating scale and recording chart; third, with recording chart and integrating dials; and fourth, with indicating scale, recording chart and integrating dials.

With the use of meters, their record of the performance of the apparatus to which they are connected shows whether it is operating at the greatest efficiency or not. Surprising conditions have been brought to light by their use. A flow meter on each boiler of a battery running in multiple on the same header shows just what each is doing and so permits adjusting the operation of the units that the load will be evenly distributed between them. They also indicate immediately whether the load has increased or the steaming rate of the boilers decreased in case the steam pressure begins to drop. From the graphic record of steam pressure, it is also possible to determine whether the method of

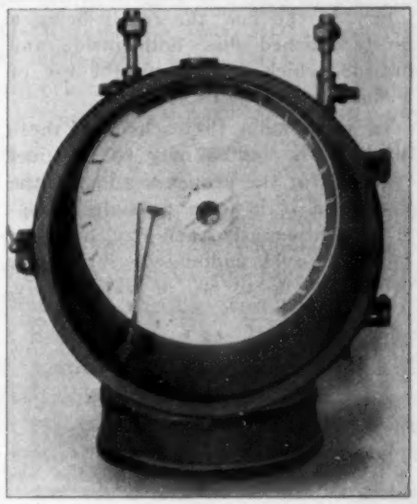


FIG. 3—ANOTHER TYPE OF RECORDING FLOW METER

firing can be made more efficient or not. In a large plant the use of flow meters segregates the costs of the steam, water, etc., so that each department can be charged with its reasonable proportion.

Pneumatic Flue Welding

To the Editor:

We have noted with interest the recent reference in THE IRON TRADE REVIEW to pneumatic flue welding in a locomotive building plant. Our experience has been similar. Previous to the installation of the welder, our flues were scarfed and welded by hand, an ordinary coal fire being used for heating. The average cost of operation per 2-inch flue was 12½ cents and the production per day for two men was about 40.

After installing the welder and an oil furnace with two openings, we have reduced the cost to 2½ cents per flue and have increased the production to 550. In addition to the scarfing and welding, the operators also rattle and cut-off the flues and stubs.

One noticeable advantage that we find in the welder, in addition to the decreased cost and increased production, is that the mandrel and dies are the same size as the flue; this prevents injury to the flue, the result being a nicely finished flue, both inside and outside, which will permit the use of a flue scraper.

In our opinion, the capacity of these machines is limited only to the time required for the proper heating of the flues, and if it were possible to operate continuously each day, a larger furnace would undoubtedly bring the production up to 800 or 900 per day.

P. H. E. & T. Co.

* * *

Hydraulic Stripping

To the Editor:

I understand that at Riverton, Minn., mine is being stripped by hydraulicing. Can you inform us what kind of pump is used?

SUPT. B. MINING CO.

We presume you refer to handling the material from the sump into which it is washed down by hydraulic giants. At this point it is sucked up by a Morris sand pump and is passed through a pipe line into a nearby depression. The pump, which is belt-driven, has a 12-inch suction and 12-inch discharge. It is especially designed for the service, being capable of passing stones or solids up to about 10 inches in diameter.

* * *

Turbine-Driven Feed Pumps

To the Editor:

Do you know of any boiler feed pumps driven by steam turbines that are in service in power plants of steel mills? If so, how are they regarded? O. E. K.

We referred this inquiry to the chief engineer of one of the largest mills in the country and he replies as follows: "We have in operation two 6-inch, 2-stage pumps delivering 1,000 gallons per minute against a total net head of 362 feet, at 2,900 revolutions. They are driven by a 200-horsepower steam turbine and are used for supplying boilers with feed water. We are very well satisfied with the operation of same, but have no test data available."

* * *

Steam for Heating Purposes

To the Editor:

Can steam be drawn from the low pressure received of a 32 and 68 x 54-inch Corliss engine, running condensing, and used for heating purposes with economy over live steam? If so, in what quantities can it be drawn, and what saving might be effected?

V. MCH. CO.

There can be no economy if the full power of the engine is required for whatever purpose it may be used. The question of relative economy depends entirely on the conditions of expansion and condensing and terminal pressures. If the pressure of the receiver mentioned is comparatively high and the vacuum obtained is low, there might be some economy rather than from the boilers, but it would depend on the system of heating in use and the arrangement of service and return; so that the problem is purely a local one and can only be solved when all the conditions are known. We would advise you to consult the concern from which you purchased the boilers and engine or some good power plant engineer in your city.

Rod Stock

To the Editor:

We wish you could induce the steel companies to be more specific in their offerings of rod stock. The term *wire rods,* for example, is hardly specific enough for us to determine whether we are interested or not. We use galvanized steel pump rod, and if we want to go outside of our customary channels of purchase, we have to write around to find out who else makes it.

T. D. Co.

* * *

Size of Lathe Motor

To the Editor:

What size motor is required for an 8-foot lathe, with, say, 18 inches swing, working on hard nickel steel? How much power will it take running idle?

E. T. CO.

For this service a 5-horsepower motor will be ample. One standard machine of the size mentioned, on which we knew of a test being made, required between 3 and 4-horsepower under the condition mentioned. While running idle the current consumption was only ¼ horsepower, but at higher spindle speeds than were used it might have taken up to ½ horsepower.

* * *

Thin-Lined Furnaces

To the Editor:

In an article entitled "Developments in Lining Blast Furnaces", published in THE IRON TRADE REVIEW, Sept. 4, 1913, the practice inaugurated at the Lucy-Isabella furnaces some years ago was referred to. Have you any information as to what experience the Carnegie Steel Co. had with these linings after the first year or two? V. D. B.

We can answer this question by directly quoting the operators, who recently advised us as follows:

"The thin-lined furnaces at both our Isabella and Lucy furnace plants are running as originally built, with practically no changes, and are doing very satisfactory work. They are more than coming up to expectations and are considered by us a very successful experiment."

IRON AND STEEL MARKETS

Many Consumers Willing to Make Contracts

But Mills Are Cautious About Commitments for the Future—Railroads Inquiring for Track Fastenings—Harvester Company Buys More Pig Iron

BY GEORGE SMART

Decided increase in interest in the market on the part of buyers, with greater willingness to make contracts for finished materials, has characterized the past few days. Mills are disposed to adopt a conservative policy as to contracts and while they will contract through the first half of the new year on steel bars, there is strong disposition to make three months the limit on other finished materials. Owing to the bitter experiences of past years, when buyers have freely cancelled contracts on a declining market, short time contracting is being strongly urged by leading companies. Many plants, including some blast furnaces, will cease operation for at least ten days during the holiday season.

When very low prices are made, it is usually in connection with the sale of a considerable tonnage, as, for example, on 15,000 tons of plates, shapes and bars taken by a Pittsburgh car builder, some of the tonnage is said to have gone at 1.15c, Pittsburgh, and some at 1.20c. Moderate improvement is maintained in England and in Germany and Belgium quotations on steel products are firmer. Scotch pig iron is higher and Middlesbrough warrants have advanced. Evidence accumulates that the turn for the better has come in foreign lands. Steel bars are offered by German makers at considerably below American prices, but physical and chemical properties are not guaranteed.

Plates and Sheets

A leading maker of plates in the east last week booked orders up to 100 per cent of its capacity, which it had not been able to do for about nine weeks. Another company reports business about 50 per cent better. Many sales offices throughout the country state that there is a larger miscellaneous tonnage being entered and that inquiry is much improved. Low prices continue to prevail and there has been some further sagging. While 1.20c, Pittsburgh, is the usual minimum on plates, 1.15c, Pittsburgh, has been rather freely done in the Chicago district and on lighter plates in other parts of the country. Still lower quotations have been made on sheets, which have sagged to 2.85c, Pittsburgh, on galvanized No. 28, 1.85c on black and 1.35c on No. 10 blue annealed. Some mills are not making these very low quotations.

Pig Iron

In addition to the 40,000 tons purchased by the International Harvester Co., as reported last week, this company has ordered 20,000 tons for eastern plants, including 4,200 tons for delivery to its Springfield, O., works. Various reports are current as to additional purchases having been made by the American Steel Foundries and it is believed that a fair tonnage has been picked up. Eastern Pennsylvania makers are very much dissatisfied with present conditions and contemplate banking some furnaces, as they are unwilling to meet competitive prices. Buffalo iron is being offered in Philadelphia territory at $12.75, furnace, for No. 2X. Low prices continue to be made at Cleveland, also, and on 2,500 tons of basic taken by a Canton consumer, $12.75, Cleveland, was shaded. Prices of southern iron and southern Ohio iron are softer. On southern No. 2, quotations range from $10.50 to $10.75 for nearby shipment, but some southern iron is going at the full $11 basis. A Lynchburg foundry purchased 3,000 tons of low grade iron on the $11 basis for first quarter delivery. In New York territory, there has been considerable activity in pig iron, where at least 15,000 tons have been sold during the week. This is the best tonnage in a number of weeks.

Railroad Buying

The Canadian Pacific has placed 100,000 tons of rails with the Algoma Steel Co. and 25,000 tons with the Dominion Steel & Iron Corporation. A heavy demand for standard spikes has appeared. A southern railroad has purchased 10,000 kegs, and the Louisville & Nashville 5,000 kegs. The Seaboard Air Line is inquiring for 10,000 kegs for 1914 delivery, the Norfolk & Western for 5,000 to 10,000 kegs, and the Chesapeake & Ohio for 3,000 kegs. Still more important inquiries are expected. Prices of standard spikes are not over 1.50c, Pittsburgh. One eastern railroad has practically closed for 15,000 tons of rails and another has taken 5,400 tons. The Norfolk & Western has increased its recent rail order to 29,000 tons. Car orders have been coming in rather slowly.

Lower Prices Feature Pittsburgh Market

But There is Better Inquiry for Finished Lines—Fair Activity in Pig Iron—Many Mills to be Idle During Holidays

BY C. F. WILLIAMS

Office of THE IRON TRADE REVIEW,
2148-49 Oliver Bldg.,
Pittsburgh, Dec. 16.

Somewhat better inquiry for finished lines has come out during the last fortnight, and several prominent iron and steel company officials believe the end of the present depression is in sight. Lower prices, however, continue to feature the market, and price irregularity probably will prevail until the end of the year. On small tonnages, mills are maintaining prices fairly well, but concessions continue to be offered when attractive orders are involved. Plates and bars are being held at 1.20c, base, but reports of lower prices are heard. Structural shapes still are listed at 1.25c. Sheets have declined $1 to $2 a ton for prompt shipment, and wire products have displayed weakness in some sections of the country. Pig iron is fairly active, but weak. More prominent coke operators are asking $2, ovens, for contract blast furnace fuel, and it is claimed some tonnage has sold at that figure. As the holidays approach, mill managers are arranging to close plants, and some iron and steel works will be idle 10 days or two weeks.

Pig Iron.—Reports from the east to the effect that the American Steel Foundries have obtained 10,000 tons of first quarter basic for plants at Sharon, Pa., and Alliance, O., are believed to be incorrect, although it is understood that this interest has quietly taken some basic for shipment to those points. A week ago, the American Steel Foundries bought 15,000 tons of basic in the south, for consumption at St. Louis, at what is understood to be a rather low figure. The United Steel Co., Canton, O., last week obtained a round tonnage of basic from a Cleveland interest at a shade below $12.75, Cleveland. Basic is not over $12.75, valley. Bessemer is quiet. The Standard Sanitary Mfg. Co. is in the market for 1,500 tons of No. 2 and 500 tons of No. 3, for first quarter shipment to Louisville, Ky., and is also negotiating for a small tonnage of northern foundry for prompt delivery.

Ferro-Alloys.—English and German grades of ferro-manganese are being held at $47, seaboard, and 50 per cent ferro-silicon is being held at $75, Pittsburgh. Lower grades of ferro-silicon have declined $1 a ton.

Plates and Shapes.—Plates continue to be held at 1.20c and shapes at 1.25c, although reports are heard that both figures have been shaded in a number of instances when attractive tonnages were involved. Inquiries have been coming out more freely the last fortnight and manufacturers believe order books will show no further decrease in tonnage. Some of the smaller mills have offered light plates at 1.15c.

Sheets.—Specifying this month has been comparatively heavy, but price irregularity continues to feature the market. Galvanized sheets, for quick delivery, have sold at 2.85c for No. 28 gage, or $1 a ton less than the minimum market of a week ago. Black sheets have sold at 1.85c and blue annealed sheets at 1.35c. Practically all the sheet mills in this district will be down during the holidays, and some of them will be idle 10 days.

Rails and Track Material. — Mills rolling rails in this district have enough tonnage on their books to assure maximum operation until Jan. 1, before which time a number of large orders for 1914 shipment will have been placed. Demand for spikes, track bolts, and splice bars is heavy, but prices are low.

Billets and Sheet Bars.—Consumers have entered the market for first quarter needs, and some of them are attempting to cover requirements through the entire year. Sellers, however, do not appear anxious to sell at prevailing prices. Billets are being held at $20 and sheet bars at $21, makers' mill.

Hoops and Bands.—Hoops are obtainable at 1.40c for small tonnages and bands are listed at 1.20c. Demand is light.

Iron and Steel Bars.—Some inquiry has come out for steel bars, but the price is somewhat irregular. Leading makers are holding this product at 1.20c, but rumors are heard of lower prices. Iron bars are nominally quoted at 1.40c, but the price has not been tested. Shafting is listed at 63 per cent off for carload lots. Reports of lower prices are heard.

Tubular Goods.—Demand for lap weld steel pipe continues fairly satisfactory, and pipe mills are comparatively well filled up with orders. Manufacturers say discounts on both steel and iron pipe are being well maintained. The market for boiler tubes is quiet and prices are somewhat irregular.

Bolts, Nuts and Rivets.—The market for all three products is irregular. Structural rivets have sold at 1.70c, or $2 a ton less than the previous prevailing price. Nut and bolt discounts show no uniformity, manufacturers quoting according to the tonnage involved.

Tin Plate.—With practically all the more important consumers under cover for next year's requirements, the tin plate market is quiet in reference to new buying, but specifying has been fairly heavy.

Wire.—Manufacturers are holding nails at $1.55 a keg, although lower prices have come out in some sections of the country. Some of the leading wire manufacturers in this district plan to close mills during the Christmas holidays, and a few of the plants will be idle 10 days or two weeks. Demand is light, despite low stocks.

Wire Rods.—The market is decidedly quiet, but indications are that the prevailing nominal quotation, $26, Pittsburgh, could be shaded 50 cents or $1 a ton.

Coke.—It is understood that a prominent eastern consumer has covered first half furnace requirements, although nothing has been given out regarding the price. A number of the more prominent coke operators are asking $2, ovens, for contract 48-hour fuel, and several shippers claim they will blow out ovens if the market cannot blow out ovens if the market Several consumers report they have obtained fuel for shipment the early spring of 1914 at $1.75, ovens, and less. Foundry coke is commanding $2.65 and $2.75, ovens, for best grades. The Connellsville Courier, for the week ending Dec. 6, says production was 321,927 tons, a decrease of 22,181 tons compared with the week before. More than 1,700 ovens went out of blast the first week in December.

Old Material.—Heavy melting steel has sold at $10.75, or 50 cents a ton less than the prevailing quotation of a week ago, and other grades are correspondingly weak. Youngstown and Sharon, Pa., consumers have been figuring in the market, and some buyers have refused to pay $10.75 for material. All grades of scrap are plentiful and middlemen do not expect to enjoy better conditions until after the general market becomes more certain.

The J. H. Hillman & Sons Co., coke, coal and pig iron dealers, now located on the twenty-first floor of the Oliver building, Pittsburgh, will occupy a suite of 16 rooms on the seventeenth floor of that building after Jan. 1.

More Buying in the Chicago District

Purchase of the International Harvester Co. Larger Than Reported Last Week—Some Low Prices on Finished Materials

BY H. COLE ESTEP

Office of THE IRON TRADE REVIEW,
1521-23 Lytton Bldg.,
Chicago, Dec. 16.

The general impression prevails in the west that steel prices are at or near their minimum. Sales of finished materials during the past week have shown some increase in volume and railroad orders are somewhat more numerous. In certain cases, buyers are showing a desire to contract and this applies particularly to sheets. As a rule, manufacturers are limiting their commitments to the first quarter, although favored customers are able to obtain contracts for six months at prevailing prices. Steel bars apparently have not sagged under 1.20c, Pittsburgh, but sheared plates have been offered in this market at 1.15c and shapes are openly quoted 1.20c.

Pig Iron.—Interest during the week has centered on the activities of the International Harvester Co., which purchased an aggregate of 60,000 tons for its first quarter requirements. Of this about 40,000 tons reported in last week's issue was obtained from Chicago furnaces for local consumption. None, however, was purchased for Milwaukee, the Illinois Steel Co. being under contract to deliver iron to this plant. In addition, some 20,000 tons were purchased for eastern plants, including 4,200 tons for delivery to the Springfield, O., works. Very little information regarding the price at which this business was placed is available, but it is believed that the local iron was obtained at a price better than $14.50, Chicago furnace. There is improved inquiry for southern iron, including one lot of 2,000 tons for the Green Engineering Co. The L. Wolff Mfg. Co. has purchased 500 tons of southern iron for first quarter delivery. Most southern producers are holding at $11, although some local representatives have been accepting business at $10.75, Birmingham, for first quarter delivery. A Chicago foundry has purchased 4,000 tons of southern iron for first half shipment at approximately $14.25, delivered.

Merchant Bars.—The steel bar situation shows very little change and prices are hovering in the neighborhood of 1.20c, Pittsburgh, equivalent to 1.38c, Chicago, although attractive orders would undoubtedly be accepted at 1.35c, Chicago. In fact, the tendency to tacitly ignore the 18-cent freight rate between Chicago and Pittsburgh is becoming more pronounced. Iron bars remain at approximately the same level with little variation in the volume of business. The Republic Iron & Steel Co. continues to operate its East Chicago mill at full capacity. Other iron mills in this territory are not so fortunate as regards tonnage and are running under reduced schedules. Hard steel is moving slowly, although the continued mild weather has lengthened out the period of activity for concrete reinforcing material. Shafting is weak and irregular. Very little agricultural business is expected this year.

Plates and Structurals.—A feeling prevails in the Chicago district that quotations on the heavier finished materials have about reached their lowest ebb and buyers are displaying slightly more interest in their future requirements. A sprinkling of railroad orders for plates and shapes has appeared. Sheared plates will now be sold at 1.33c, Chicago, equivalent to 1.15c, Pittsburgh, although fair orders are being taken at $1 a ton higher. Shapes are openly quoted 1.38c, Chicago. On an order for 1,000 tons of structural material placed with a Chicago mill last week the buyer was unable to do better than 1.20c, Pittsburgh, indicating that this is practically the minimum.

Rails and Track Fastenings.—There are rumors of extensive rail sales which cannot be confirmed, but it is not improbable that some of the western lines have quietly released a portion of the business which they must place in the course of time. A considerable tonnage of track fastenings is known to have been sold during the week, including one order for several hundred tons taken by an independent eastern mill. Prices on track fastenings are unchanged. The volume of light rail business is fair, and this business is of assistance in furnishing much needed tonnage.

Bolts, Nuts and Rivets.—There is very little new that can be said of the rivet situation except that prices are showing a little less weakness and some market observers believe the turn is near at hand. We continue to quote structural rivets 1.85c, Chicago, although slightly higher prices are obtainable on small quantities. Agricultural specifications are limited.

Sheets.—Buyers generally are showing a desire to get under cover at the prevailing prices, but most of the manufacturers are unwilling to contract for more than three months except under special circumstances. It is now evident that December will bring out more tonnage than November. Mill prices for prompt shipment are unchanged from 1.90c and 2.90c, respectively, for the base gages of black and galvanized sheets. Contracts for the first quarter may be made on this basis. Mill operations are unchanged.

Wire Products.—Careful investigation indicates that the market is rather firmly established at 1.55c, Pittsburgh, for wire nails and 1.35c for plain wire. One or two syndicate buyers have been endeavoring to place business at lower quotations without success. Orders from the manufacturing trade are fairly good and the continued mild weather has had a beneficial effect on business originating in farming communities.

Cast Iron Pipe.—There have been no municipal lettings of importance recently and the market is dull and spiritless. Prices are nominally unchanged, although independent foundries are observing no regular schedule of quotations. Very little change is expected in the situation this year.

Merchant Pipe and Tubes.—Boiler tube discounts are an object of attack, but are resisting fairly well considering general conditions. Mild weather has prolonged the usual season of building operation and this has had a slightly beneficial effect on the demand for the more commonly used sizes of merchant pipe. The local mill has not changed its rate of operation recently.

Old Material.—Scrap prices seem to be approaching their minimum and cutting is less pronounced. A few items are lower, but in the majority of instances quotations have changed very little during the past 10 days. Consumption is still limited, but is not showing any tendency to fall off. Some extremely low prices have been made on No. 1 railroad wrought, including $8.25, Chicago, in one instance. Quotations on iron car axles have suffered severely recently owing to heavy railroad sales. No. 1 busheling is also somewhat weak. Melting steel is steady. The receivers of the St. Louis and San Francisco sold 235 tons on Dec. 15. This list included 100 tons of No. 3 steel rails.

Cleveland Buyers More Interested

And Many Are Willing to Make Contracts for Finished Materials—Very Low Quotations on Plates, Sheets and Pig Iron

BY GEORGE SMART

Office of THE IRON TRADE REVIEW,
Penton Bldg.,
Cleveland, Dec. 16.

Iron Ore.—Lake navigation is practically over for the season, the last boat being scheduled to reach port tomorrow morning. Ore shippers were through 10 days ago, and there is nothing of interest to note except the tabulation of ore statistics for the season. As known, Lake Michigan has become of recent years an important ore receiving lake. Out of the total movement of 49,070,478 tons, 8,701,732 tons were received at Lake Michigan ports, distributed as follows:

Port.	Season 1913. Gross tons.
South Chicago, Ill.	5,572,866
Indiana Harbor, Ind.	455,252
Milwaukee, Wis.	234,591
Gary, Ind.	2,365,551
East Jordan, Mich.	28,444
Boyne City, Mich.	45,028
Elk Rapids, Mich.	.....
Total	8,701,732

The ore receipts at Lake Erie ports for the months of November and December were as follows:

	Nov.	Dec.
Buffalo	543,817	31,400
Erie	96,725	.....
Conneaut	535,219	.....
Ashtabula	740,746	50,796
Fairport	120,115	.....
Cleveland	693,967	29,772
Lorain	240,021	.....
Huron	54,028	.....
Sandusky	.....	.....
Toledo	112,612	16,753
Detroit	61,991	6,711
Total	3,199,241	135,432

Pig Iron.—Some sellers report a slight improvement in demand, but prices are very low. On foundry iron for delivery outside of the city, $12.75 has been done on No. 2, and on 2,500 tons of basic taken by a Canton company, $12.75, furnace, was shaded.

Coke.—Prices have not changed, but the market shows signs of weakness. Furnaces continue to follow the practice of buying from month to month and very little is being done in foundry grades.

Finished Materials.—A gratifying feature of the situation has been the marked increase in interest on the part of numerous buyers who are showing a willingness to make contracts for long periods. On bars, contracts can be made at 1.25c, Pittsburgh, for six months, but on shapes and plates mills are not willing to contract for more than three months and 1.20c is apparently the minimum. On prompt business, however, 1.15c has been done on plates. Sheets are very weak and the minimum quotations are now 1.85c on black No. 28, 2.85c on galvanized No. 28 and 1.35c on No. 10 blue annealed. Some mills will not make these low quotations. Several railroads are inquiring for shapes, plates, bars, spikes and rivets and more railroad business is pending at the present time than for months. On steel bars, 1.20c is at present the minimum, but on a large tonnage this probably could be shaded for prompt shipment. Bar iron is dull and mills are running irregularly.

Old Materials.—Conditions in the local scrap market have not improved during the past week. Dealers say the situation is worse at present than at any time this year. Heavy melting steel quotations have declined from $9.50 to $9.75 to $9 to $9.50. No. 1 machine cast is practically unsalable. Foundries have no orders to work and do not care to buy any materials ahead. In order to place one carload at an extremely low price, a dealer was compelled to date his invoice Jan. 2 after a canvass of all the foundries in this city. Little business is moving in any description, as melters are preparing for the year-end inventory.

IMPROVED DEMAND

In the South—Decline in Prices Does Not Apply to Southern Delivery.

Office of THE IRON TRADE REVIEW,
Birmingham, Ala., Dec. 16.

Pig Iron.—The market conditions have improved very materially during the past week. Inquiries are much more numerous and rumored sales are of fine volume. The reported sale of 2,500 tons of foundry iron for export to the Mediterranean ports of Venice and Trieste, seems to be true. Prices are considered firm at $11 to $11.50 per ton for No. 2 foundry, basis, Birmingham, for southern delivery. The feeling is general that consumers are satisfied that the low level in prices has been reached, and that a buying movement will start up very soon after the holidays are over. The aggregated sales entered during the week amount to some 7,200 tons with a prospective entry of 6,000 other tons. Of the tonnage entered, 6,700 tons was foundry iron and entered in lots of carload to 1,000-ton lots, and special analysis iron from carload to 100-ton lots, amounting to 500 tons, at the usual premium over No. 2 foundry. The beginning of operation by the National Cast Iron Pipe Co., near Boyles, Ala., and also the American Steel & Wire Co., at Fairfield, Ala., on the first of the new year, will require a daily tonnage of at least 200 of foundry iron and 500 tons of steel billets. The Gulf States Steel Co., at Gadsden, Ala., has recently put in blast furnace for making basic iron.

Cast Iron Pipe.—No improvement is reported in the general condition of cast iron pipe market. Orders of small tonnage for repairs and extensions seem to be the only business of any volume. One small order for a few thousand feet of 8-inch water main was the largest size order reported for the week. The plants are all on restricted operations and conditions are much below normal. No complete cessation of operation is reported and the organization of labor forces is being fairly maintained.

Old Materials.—The scrap iron market is almost completely at a stand and only such tonnage is moving as previous contracts require. The dealers are quietly abiding their turn and are only buying additional tonnage at bargain prices. No change of quotations is authorized.

Under instructions from Judge Sanford in Federal court, at Chattanooga, the jury in the case of James Supply Co. vs. the Dayton Coal & Iron Co., returned a verdict for the defendant. The effort of the case was to declare the Dayton Coal & Iron Co. bankrupt, but failed. The company is in the hands of a receiver.

The annual dance and entertainment given by the Lunkenheimer Co., of Cincinnati, to its employes, was held on Dec. 13, at the Armory, that city. About 5,000 persons attended, including men and women occupying positions in all of the various departments of the Lunkenheimer Co.

Three trainloads, 2,500 tons of pig iron, are to be shipped by the Tennessee Coal, Iron & Railroad Co., from Bessemer, Ala., to Savannah, for shipment to Austrian and Italian ports.

A. H. Ford, president of the National Cast Iron Pipe Co., Boyles, Ala., announces the plant will begin operations Jan. 5. Construction is practically complete and equipment is in place.

Prices of Southern Pig Iron Decline

Quotations 50 Cents Lower for Most Makers—Southern Ohio Iron is Also Weak—Market is Quiet

BY S. G. BACKMAN

Office of THE IRON TRADE REVIEW,
503 Mercantile Library Bldg.,
Cincinnati, Dec. 16.

Pig Iron.—Minimum quotations on both southern and southern Ohio iron have declined 50 cents a ton within the past week. Southern No. 2 foundry can now be had at from $10.50 to $11, Birmingham basis, for either prompt or first half shipment. Most of the iron to be had at the lower figure, however, is for immediate delivery, but offers have been made at this price for extensions into the first quarter. The majority of furnaces in both Alabama and Tennessee, though, are still holding at $11, Birmingham, for either prompt or first half shipment, and sales being made at this figure are probably in excess of those at the lower price.

The general price for southern Ohio No. 2 foundry iron for either spot or first half shipment is now $13, Ironton, in comparison with $13.50, Ironton, at this time last week. A few of the furnaces in that district are still holding at $13.50 for any delivery from the present time over the first half, and report several sales made at this figure within the past few days.

The market, generally speaking, is very quiet and most of the sales being made at the present time are for nearby shipment. This indicates that melters are withholding from contracting until after the first of the year, and are only taking small lots from time to time as requirements actually demand. In a number of cases, also, buyers are not taking the full tonnages specified in their inquiries.

Local sales within the past few days include 2,500 tons of malleable iron to a southern Indiana melter, 3,000 tons of Lake Superior charcoal iron for shipment into Michigan, 5,000 tons of northern and southern grades to a Detroit interest, 600 tons of southern Ohio foundry iron to a southeastern Ohio user, and 200 tons of the same grade to a southern Ohio melter. There are inquiries here for 500 tons of southern foundry iron from the Louisville & Nashville railroad, 600 tons of assorted grades from central Indiana, and 2,000 tons of southern iron from a large nearby melter.

Coke.—The market remains very quiet and unchanged in regard to prices and conditions in general. Operators generally report that they have put out a large number of ovens within the past week in order to equalize the demand and production, since the former has fallen off to a large extent recently. Consumption, however, is apparently less than production in most of the fields, especially in the Connellsville district, which is accordingly weaker than any of the others. In the Wise county district, production and consumption are practically equal, the latter probably being a little in excess. In the Pocahontas and New River districts, most of the coke being produced is contracted for. As a general rule, spot coke can be had a little cheaper than contract coke. The furnaces are showing no inclination to buy, although they have been due for some time to contract for the next six months. The majority of foundries in this territory have contracted for their requirements up until next July and are not expected to do any more buying until after the first of the year.

Finished Material.—Warehouse prices have generally declined $2 a ton within the past week, due principally to the dull condition of the market and to the recent similar decline in Chicago, St. Louis and Pittsburgh. Iron bars are now quoted at from 1.70c to 1.80c, steel bars at from 1.75c to 1.90c, plates and shapes at from 1.85c to 2c, and blue annealed sheets at 2.05c to 2.10c. Black and galvanized sheets No. 28 gage and shafting are unchanged. Buying and selling has been as light during the past two or three weeks as it has been in years. Buyers are taking inventory at this time of the year, but aside from this, there has been a gradual falling off in demand for more than a month. It is the general opinion of dealers here that there will be no new developments before the first of the year.

Business has been fair with the local sheet mill during the past week, and specifications on both old and new contracts are fairly satisfactory. The mill is now about three weeks behind on deliveries, including black, galvanized and annealed sheets. Prices are as follows, f. o. b. Newport (Ky.) and Cincinnati: Black sheets No. 28 gage, 2.05c to 2.10c, and galvanized No. 28 gage, 3.05c to 3.10c.

Old Material.—A fair sized sale of bundled sheet scrap, cast borings and machine shop turnings has been made to a large near-by melter with deliveries to extend over the remainder of this month. The prices involved are reported as follows: Bundled sheet scrap, $4.75; cast borings, $4.75, and machine shop turnings, $4.75, all per net tons, f. o. b. dealers' yards. The market as a whole is very quiet and prices are correspondingly weak. There is apparently a large surplus of scrap available throughout this territory, and conditions cannot improve to any extent until this has been reduced. Melters at the present time, however, are generally taking inventory and as most of them appear fairly well supplied for some time to come, a betterment of the geenral situation is not expected before the first of the year, if then.

Latest developments in the erection of a new generating plant of the Union Gas & Electric Co., Cincinnati, indicate that more equipment will be installed than was at first determined. It was first planned to generate 50,000 horsepower, but it is more than probable that this will be increased to 80,000 or 100,000 horsepower when the plant is built. Bids for this equipment have not as yet been asked for.

Long & Alstatter, of Hamilton, O., and the Cincinnati Tool Co., Cincinnati, have taken space in the permanent manufacturers' building, which will soon be erected in Cincinnati for the purpose of exhibiting manufacturers' products throughout the entire year.

A fair sized lot of woodworking machinery will probably be needed by the Ficks-Reed Co., furniture manufacturers of Cincinnati, which has plans under way for the erection of a large factory building on Findlay street, that city.

Sealed proposals will be received at the office of the director of public service, Cincinnati, until Dec. 22, for the furnishing of a large number of cast iron pipes and special castings for the water distribution system of that city.

The Anti-Frost Stove Co., of Cincinnati, has been incorporated with a capital stock of $25,000, to manufacture heating devices for greenhouses. Charles M. Egan, W. E. Mayer and E. J. Reiss are among the incorporators.

The Portsmouth Engine Co., of Portsmouth, O., has increased its capital stock from $30,000 to $40,000.

Heavier Specifications in the East

And Some Increase in Tonnage Entered—Pig Iron Dull and Some Furnaces May Be Banked—German Quotations

BY C. J. STARK

Office of THE IRON TRADE REVIEW,
326 Real Estate Trust Bldg.,
Philadelphia, Dec. 16.

Some actual increase in the tonnage entered in plates, billets, steel bars and in some other lines appeared in eastern territory the past week, further attesting the more favorable sentiment in finished steel. Buyers continue to manifest greater desire to cover ahead and some additional contracts have been taken. Eastern mill operations, however, remain very irregular, some plants being down one or more days a week. The Alan Wood Iron & Steel Co. will shut down its steel works and all finishing mills Dec. 20 for repairs and the holidays, and the date of its resumption is indefinite. Pig iron remains dull with prices weak. A good sized sale of southern iron was closed in this district on $11 basis for No. 2.

Pig Iron.—Expressions of dissatisfaction with the sparse tonnage offered and with the ragged prices prevailing has become more pronounced among eastern Pennsylvania merchant iron producers. Several makers, though their production is down to a practical minimum, are serriously considering banking some of their active capacity. Sales in this territory the past week have been extremely small. Lower prices have developed in some sections, particularly central Pennsylvania, where a shade below $15, Philadelphia or Baltimore, for No. 2X, or close to $13, furnace, is being made. Some eastern Pennsylvania iron has recently been sold at $14, furnace, for No. 2X, equivalent to less than $15, Philadelphia. Buffalo No. 2X has been offered in this district at $12.75, furnace, or $15.20, delivered. Makers of standard brands of eastern Pennsylvania No. 2X will not meet the extreme inside figures, and ask $15.25 to $15.50, delivered, though one maker would probably do $15, delivered. The Lynchburg Foundry Co., Lynchburg, Va., has purchased 1,000 tons each of gray forge, No. 4 and No. 3 southern, for first quarter shipment at $10, $10.25 and $10.50, Birmingham, or on the full $11 basis for No. 2. The Standard Cast Iron Pipe & Foundry Co., Bristol, Pa., which recently inquired for a block of low grade iron, has purchased 1,000 tons. The Pennsylvania railroad has taken no action on its inquiry for 3,250 to 6,500 tons of various grades, and the Norfolk & Western railroad still figures on 1,200 tons. The Pennsylvania Steel Co. was a recent purchaser of several hundred tons of foundry iron for Steelton. An inquiry for 6,000 tons of forward basic for a New England buyer is before eastern Pennsylvania makers, but there have been no recent sales of this grade, and prices remain untested. Leading makers of standard low phosphorus iron have reduced prices 50 cents a ton to $21.50, delivered eastern Pennsylvania, to meet the competition of English iron. Some sales on the new basis are reported.

Iron and Steel Bars.—One of the leading German mills has quoted eastern buyers base prices of 1.16½c c. i. f., New Orleans, New York and other Atlantic ports on Thomas Bessemer steel bars and 1.20c c. i. f., the same ports, on Siemens-Martin steel bars. The base sizes specified are ½ to 5 inches on rounds and squares on a considerably larger range than American mills. Steel bar makers report the largest specifications in a number of weeks, were received the past week. New business is small, however. Prices remain 1.20c, Pittsburgh, or 1.35c, Philadelphia, on lots of size. Bar iron mills in the east are operating spasmodically, as business is inactive. Prices are 1.25c to 1.30c, Philadelphia.

Plates.—More active buying is reported by several makers. An eastern mill during the past week booked in excess of full capacity and the tonnage was the best in about two months. An Ohio mill has entered about 2,500 tons recently for shipyards in this district. Eastern makers have booked several additional contracts for first quarter at 1.25c, Pittsburgh, but are declining to accept tonnage for first half at ruling prices, although some of the largest buyers in this district are endeavoring to cover for that period. Current plate prices are from 1.20c to 1.25c, Pittsburgh, or 1.35c to 1.40c, Philadelphia. The Cramp shipyard has recently booked an order for two 10,000-ton vessels, which it is understood are for the Emery interests, Boston, for a new line through the Panama canal. The purchaser is expected to contract for other boats later.

Structural Shapes.—New tonnage going to eastern structural shape mills is quoted poor, and some of the plants are being kept down for one or more days a week. While 1.25c, Pittsburgh, is quoted openly, 1.20c, Pittsburgh, or 1.35c, Philadelphia, is pretty common, even on the smaller lots, from eastern makers.

Sheets.—Buyers are showing more interest in their early requirements and the miscellaneous tonnage coming out is keeping the Conshohoken mills running full. These mills are to go down for repairs and the holidays at the end of this week. The going price remains 1.45c, Pittsburgh, or 1.60c, Philadelphia, for No. 10 gage blue annealed.

Semi-Finished Material.—Considerably more inquiry for billets has appeared and sales are heavier. The Singer Mfg. Co., Elizabethport, N. J., is inquiring for 10,000 to 15,000 tons of various sizes of Bessemer and open-hearth billets for 1914 delivery. A Lebanon, Pa., consumer placed 2,000 tons of large billetsl with an eastern Pennsylmania mil and recent purchases of small billets by the American Hardware Co., Easton, Pa., aggregated about 2,500 tons. A good many small sales were made the past week and inquiries for about 1,000 tons of very small billets came to eastern makers from Pittsburgh. The usual price on 4 x 4-inch billets is $20, base, Pittsburgh, or $22.40, Philadelphia, but this base is understood to have been shaded considerably for eastern Pennsylvania delivery by eastern makers absorbing some of the Pittsburgh freight.

Old Material.—An embargo placed upon Johnstown, Pa., is shutting off liberal shipments to that point of heavy steel and mixed borings and turnings which have been attracted there from eastern districts in recent weeks by the higher prices offered. Some of this material has been coming out of New England. Recent sales to Johnstown of mixed borings and turnings have been at $7.25, delivered. The eastern Pennsylvania market remains very dull. Heavy steel in small lots has gone at $9.75, delivered. Considerable inquiry for low phosphorus scrap is current, but the mills because of lighter operations are unable to offer much tonnage.

Organizes Structural Company.—E. L. Marshall, formerly New York representative of the Passaic Structural Steel Co., has organized the Empire Structural Steel Co., Inc., of 30 East Forty-second street, New York City, and now is engaging in a general line of structural steel business.

The Thomas Iron Co., Easton, Pa., advises it blew out its No. 8 Lock Ridge furnace, at Alburtis, Pa., Dec. 11. This leaves only one anthracite furnace, No. 7, in blast, the only furnace in the country now running on anthracite.

SOME BRIGHTER SPOTS

In the British Market—Continual Improvement in Sheets.

London, Dec. 16. (By cable.)—Middlesbrough No. 3 50s, unchanged from yesterday.

BY J. HORTON

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Dec. 6.

Pig Iron.—There is a little improvement this week in the pig iron department, and buying has now recommenced for the spring period. In Cleveland there is greater firmness than for some time past, and there is every hope that the strong inquiry will mature into substantial business, but makers are not disposed to do business for any length of time at present rates. There is a prospect of iron becoming scarcer, owing to the reduction of output, and makers' stocks are being absorbed in contracts. There has been a marked decrease in warrant stock, which now stands at 148,000 tons. Yesterday's quotations were on the basis of 49s 6d ($12.12) for warrants, with 50s 3d ($12.30) for three months. The shipments for November were 3,000 tons better than those of a year ago. In the Manchester district the same slight improvement is reported. In the Sheffield district there have been numerous transactions for East Coast hematite, comprising lots covering from one to three months' delivery. Makers are not keen for long contracts as they are hopeful of better prices next year. The large steel makers are trying to force down prices, but the Middlesbrough smelters appear to be acting together in resisting any reduction below 61s ($14.96). Apparently, the users have at last decided upon joint action against further reductions. Prices are still so unremunerative that makers are talking about damping down furnaces.

Finished Iron and Steel.—While the general finished iron trade continues dull and disappointing, a brighter streak is noticeable here and there, especially in the steel trade. A very good sign is the continued improvement in galvanized sheets, which are now quoted at £10 15s ($52.64), as a minimum, which is quite 5s ($1.22) better than a fortnight ago. Some firms will not accept below £11 ($53.86) for export. This has stimulated the trade in black sheets and sheet bars. It is gratifying also to learn that a decided improvement has taken place in the tinplate business, in which inquiries are increasing. A fair amount of business has been obtained in oil sizes on American account. A number of the sheet works have now three months' orders on their books, and are therefore disposed to hold cut for better prices, although in isolated cases makers will go below the minimum mentioned above. A large demand is expected from Eastern Europe, when the task of recuperation after the war is seriously undertaken, as it is hoped to be shortly.

The demand for tinplate bars has been improved through a reduction in the price, the Siemens Association asking £4 11s 3d ($22.34) as a minimum both for prompt and forward delivery. There is much less heard of foreign competition.

There has been a further reduction this week in the price of English steel which brings down the basis price for angles to £6 5s ($30.60). This represents a reduction of 35s ($8.80) since August. The English makers found it impossible to altogether resist this sweeping cut made in Scotland that for the present they are content with 5s ($1.22).

The prospects in Sheffield are considered excellent. There have been this week very good rail bookings, chiefly for eastern requirements.

Both the Northern and Midland Boards have issued their returns for September and October, and in both districts there are substantial reductions in the average selling price, carrying also reduction in wages. In the Midland district the fall was from £8 3s ($39.92) to £7 16s 1d ($38.22), while in the North of England there has been a falling off from £7 12s 7d ($37.36) to £7 6s 7d ($35.88). In both districts a reduction of 5 per cent takes place on the wages of forge and mill men and 6d per ton in puddling wages.

The fourth annual statement of the Canadian Car & Foundry Co., of Montreal, for the year ended Sept. 30, showed profits of $2,351,325, which, after all deductions, left $1,371,653 available for dividends—an increase of $331,721 over the previous year. After paying dividends of 7 per cent on preferred and 4 per cent on common stock, a balance of $754,153 was added to the surplus, bringing that account up to $2,194,419.

The Farmers' Oil Tractor Co., Watertown, S. Dak., advises it is building a plant there for the manufacture of tractor engines. Needs for machinery equipment will not be known for 60 days or more depending on progress of the plant.

WAITING GAME

Is Being Played at St. Louis—Prices Fairly Firm.

BY E. C. ERWIN

Office of THE IRON TRADE REVIEW,
St. Louis, Dec. 16.

Pig Iron.—Everybody seems to be playing a waiting game in the St. Louis territory, with prices hovering around $11, Birmingham, for southern No. 2 iron, for any delivery up to six months. Some users insist iron could be bought at $10.50, but the agents insist they have no such price. The position of the agents seems to be substantiated by the fact that one concern in Quincy, Ill., has had a tentative inquiry out for some time for 2,000 tons of southern iron at $10.50, but has failed to find any sellers at that figure. Another tentative inquiry for 2,000 tons of southern iron is out, but thus far has failed to find a price that attracts. Sales in St. Louis of pig iron last week probably amounted to 5,000 tons, all in small lots, and generally for prompt shipment. Northern iron is held at $14.50, Chicago, and $13.50, Ironton, with very little inquiry.

Coke.—Transactions in coke seem to have reached the minimum in dullness, and dealers are unable to see any good business in sight in the near future. Connellsville and Virginia 72-hour foundry grades are held at $2.75 to $3.

Old Material.—The mills continue to keep out of the scrap market, with all rolling mills shut down for the holidays. The steel foundries are asking for material for January and February deliveries, and the indications are that orders for some good tonnages will be available soon. Relaying rails continue to be in good demand. One lot of 28 miles is said to have been sold in St. Louis last week. Lists out to be closed this week, follow: Frisco, 250 tons; Union Pacific, 1,500 tons; Vandalia, 150 tons; M., K. & T., 3,500 tons, and 1,250 tons by the C. & St. Paul at St. Paul, Minn.

Blast furnace A, a large new stack under course of construction by the Bethlehem Steel Co., of South Bethlehem, Pa., is expected to be completed and blown in early in 1914. This furnace is 22 x 90 feet in dimensions and is equipped with five 22 x 100-foot McClure stoves and an electrically operated skip hoist. It will be a duplicate of the four large modern furnaces known as D, E, F and G, and will have a capacity of about 500 tons daily. A smaller furnace, C, now undergoing remodeling, will be completed later in the year.

Pig Iron in New York More Active

But Large Part of Tonnage Goes to Buffalo Furnaces at Low Prices—Inquiries for Ferro—Final Shipment of Wabana Ore

BY C. J. STARK

Office of THE IRON TRADE REVIEW,
503-4 West St. Bldg.,
New York, Dec. 16.

Iron Ore.—The final shipment of Wabana, Newfoundland, ore to eastern Pennsylvania consumers for the season of 1914 will arrive within the next few days. About 220,000 tons of this ore were shipped to this country in 1913, compared with about 170,000 tons in 1912. The eastern ore market remains utterly stagnant.

Pig Iron.—Some expansion in the sales of foundry iron has appeared in this district the past week. These transactions conservatively are estimated at 15,000 tons, or the best showing in some weeks. Most of this business has gone to Buffalo makers at prices ranging from $12.75, furnace, for early delivery, to $13 to $13.25, furnace, for first half for No. 2X. Most of these sales were negotiated quietly. Although lower has been rumored, $12.75, furnace, equivalent to $14.50 to $14.75, at Jersey points, and $15.20, delivered New England, for early shipment, seem to represent the inside Buffalo level, with 25 to 50 cents higher for forward iron. Eastern Pennsylvania makers are quoting $14.75 to $15.25, tidewater. A revived inquiry for 2,000 to 3,000 tons of No. 2X for first half for a Connecticut buyer, has been disposed of and it is reported that one lot of about 5,000 tons of foundry iron also has been done in this territory. A Paterson, N. J., buyer asks 800 tons of No. 2X and No. 2 plain for February-March shipment. It is reported that the International Harvester Co. has bought a round tonnage of foundry iron for Auburn, N. Y., delivery, from a Buffalo maker in addition to a large block reported last week as having been taken by this consumer from Chicago district furnaces. In basic, a Phillipsdale, R. I., consumer recently closed for about 3,000 tons with a Buffalo maker and the American Tube & Stamping Co., Bridgeport, Conn., is in the market for 6,000 tons of this grade. Several thousand tons of low phosphorus iron is in the market, little of which is for this district. The American Steel Foundries asks 2,000 tons of this grade for a western plant and a Buffalo consumer figures on 600 tons.

Ferro-Alloys.—Inquiries for at least 3,000 to 4,000 tons of ferro-manganese have appeared in the market, including one lot of 2,000 tons for all of next year, but some doubt is expressed whether many of these matters will develop into business. Sales, usually, are small. German makers have adopted the English price of $47, seaboard, as their official level, and are guaranteeing where desired, their phosphorus to equal the limits of the English material. The whole market appears quite level at $47, seaboard, although occasional reports from the west indicate that this figure sometimes is shaded on resale lots. Quoted prices in 50 per cent ferro-silicon remain largely nominal.

Plates.—Eastern mills are booking some contracts for first quarter plates at 1.25c, Pittsburgh, but it cannot be learned that the larger western mills are doing much contracting at this time. Plates for early delivery are offered at 1.20c, Pittsburgh, or 1.36c, New York, but small lots frequently bring higher figures. The equipment market continues to show more activity in both inquiries and orders.

Structural Material.—More work is appearing upon architects' boards in this territory and is in prospect for later award, according to some shape makers, but the current situation remains very dull. The initiation of new structural work at the present time is at the lowest ebb in several years, according to leading fabricators. The mills find it practically impossible to increase their bookings, which are small. Prices are more staple and rule from 1.20c to 1.25c, Pittsburgh, or 1.36c to 1.41c, New York.

Cast Iron Pipe.—The city of Schenectady, N. Y., issued specifications today for bids, Dec. 24, on 7,600 feet of 36-inch pipe, which it is estimated, will weigh practically 20,000 tons. This large requirement of pipe is for a water line. F. A. Houdlette, of Boston, is the low bidder on 650 tons for Hartford, Conn., bidding $22.68, delivered, for the 6 and 8-inch pipe, $21.70 for the 12 and 16-inch pipe and $48 for the specials. The United States Cast Iron Pipe & Foundry Co. has taken 350 tons of 6, 8 and 12-inch for New Rochelle, N. Y., at about $22.25, delivered. The market remains quiet and its tone is weak.

Iron and Steel Bars.—Small buyers are inquiring more freely for their contract requirements of steel bars for first half and makers are reluctant to close with them under 1.30c, Pittsburgh, or 1.46c, New York, for that period. So far, there has been very little contracting. The prompt market on steel bars remains 1.20c to 1.25c, Pittsburgh. The bar market, generally, has a firmer appearance. Iron bars remain 1.25c to 1.30c, New York.

Old Material.—An extremely light volume of new business has developed in this territory the past week. Prices are unchanged and are largely nominal. The placing of an embargo upon the plant of the Cambria Steel Co., Johnstown, Pa., has shut off about the only active point to which eastern scrap recently has been moving. Many of the small yards in this district have accumulated stocks which they have been unwilling to move at the low market.

Place Orders for Ships

New York, Dec. 16.—The Emery shipping interests of Boston, it is understood, have placed an order with the Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, for two fast steel steamships of about 10,000 tons burden each for a new line to be established between the Atlantic and Pacific coasts through the Panama canal. Two or more boats of equal size later will be placed, it is learned.

The Harlan & Hollingsworth Corporation, Wilmington, Del., has taken a side-wheel steel excursion boat of 700 gross tons displacement for the Louisiana Steamboat & Ferry Co., New Orleans. This boat is for service upon Lake Pontchartrain. The same yard has also taken a steel ferryboat for the Delaware River Ferry Co., for service in Philadelphia harbor.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., is now building two oil barges for the United States navy department, which were recently booked.

Charles M. Schwab, president of the Bethlehem Steel Corporation, recently at his New York City residence was the host to about 60 of the former companions and friends of his early life in Cambria county, Pennsylvania. Reminiscences of boyhood days were pleasantly exchanged by the company.

The Pennsylvania Railroad Co. has applied for permission from the Pennsylvania Water Supply Commission to build a bridge over Beaver run, Decatur township, Center county.

LIGHT SALES

Of Pig Iron in Buffalo—Very Little Inquiry is Pending.

BY FRANK R. DOLBEE

Office of THE IRON TRADE REVIEW, Buffalo, Dec. 16.

The iron market of the district has trailed off to light sales and practically no inquiry. In finished material there has been a general improvement over the past few weeks, with a development of buying looked forward to, to begin after the turn of the year, while in the old material market there is even less activity than was noted in the scant trading reported a week ago.

Pig Iron.—The sales for the week amounted to less than 5,000 tons, with a very light inquiry remaining to be satisfied, although one melter is in the market for 1,000 tons of foundry grade. Suspensions of shipments of iron under contract have been requested by a few consumers of some of the furnaces. The situation has reached the point where production will have to be curtailed in this district, or iron be stacked on the yards, if more buying for forward requirements does not develop within a very short time. The lull is reported by one of the interests to be at a lower buying level than has been apparent in this district in a number of years.

Prices remain as quoted a week ago. The furnacemen say they cannot be lowered here, as they are now at and below production cost. The scattered orders of the week that went to make up the small placement noted moved at $13.50 for No. 1 foundry and $13.25 for No. 2X foundry in some instances while these prices were slightly shaded in most of the sales where immediate shipment was wanted.

Finished Material.—The impression in mill and agency offices of the territory has reached practically a conviction that a buying movement is due to develop after the opening of the first quarter of 1914. In anticipation of this, reports indicate a larger volume of business in practically all lines than has been noted in several weeks. The attitude of many buyers to hold off for a further decline in prices, with the end in view that the schedule level of several years ago would again be reached, has been offset by the position taken by the mills so far, to oppose a further reduction in prices. Many offices are telling users that the present schedules represent practically the ultimate bottom of the sag in prices that has been in evidence for some time.

An improvement in the Canadian market is reported. There are a number of projects in sight which will require considerable structural material. The wire market is about the same as a week ago, with an improvement in the volume of buying of wire nails, booked at $1.55 for delivery in the first quarter of 1914.

Old Material.—The market is as listless as it was a week ago, with no further reduction of prices noted. There is almost a complete absence of trading, and the little activity that has heretofore been noted in borings and turnings has fallen off slightly. Prices are only nominal. Neither dealers nor consumers seem inclined to make a move. The market is like a disconnected storage battery, possessing all the possibilities of a current but with none present.

Will Build Plant

The Tioga Iron & Steel Co., Philadelphia, has purchased 50 acres at Easton, Pa., upon which it plans ultimately to erect a new plant. When this is done the present plant will be removed to Easton. The construction of the new works, however, is not a matter of the near future, and officials of the company state that it cannot be told definitely when the work will be inaugurated. No plans have yet been prepared. The Tioga Iron & Steel Co. is a subsidiary of the Taylor-Wharton Iron & Steel Co., with head offices at High Bridge, N. J. The Philadelphia Roll & Machine Co. and the William Wharton Jr. Co., both of Philadelphia, are also subsidiaries of this company, and this fact has occasioned the published report that all of these branch companies will be located at Easton. Officials of the Taylor-Wharton company, however, state there is no truth in these reports. The Tioga Iron & Steel Co. manufactures forgings. It has no iron and steel-making capacity.

Wood Plate Mill.—Work continues to go forward on the new 84-inch plate mill for rolling light gages which the Alan Wood Iron & Steel Co. is building at Ivy Rock, Pa. In view of general business conditions, no especial effort is being made to finish the plant speedily and it probably will be some time during the next quarter before the additional capacity is ready for service.

Will Buy Equipment.—The Mechanical Handlor Co., Hudson, N. Y., maker of elevating and conveying machinery, advises it will close for additional equipment prior to Dec. 25. This will consist of the following: Two boring mills, approximately 60-inch and 35-inch capacity; three lathes, about 14, 20 and 26-inch swing; one 16-foot shafting lathe; 24-inch shaper; 8-inch milling key seater; 36-inch drill press; small radial drill; key seater; centering machine; hack saw; cold cut-off saw; small shear; punch; belt hammer; bolt cutter, 2½-inch capacity.

Completing Extensions.—The structural steel work on the two extensions to the finishing department of the Granite City (Ill.) plant of the Commonwealth Steel Co., is expected to be finished by Jan. 1, when the officers of the plant will be in readiness to put a full quota of men to work in the departments. Other improvements at the plant, to be completed about the same time, also will give additional facilities for operation. The mill now is working about 2,700 men, a greater number than in its history.

The Snowdon Coke Co., Pittsburgh, advises it recently bought the plant of the Mount Hope Coke Co. and about 1,050 acres of coal, adjoining, from other owners. It is planned to increase the plant from 150 rectangular ovens to 400. Part of the equipment has been bought, but the company may be in the market for more shortly.

The Ford Motor Co., Detroit, advises its assembling plant in Pittsburgh will be of face brick and will be used for assembling manufactured parts, a retail salesroom and repair work. About 20 plants of this sort are under construction in various cities. Machinery used in them is standardized and handled from the main office.

The Canadian government is replacing the bridges at many points on the Intercolonial railway, and has let contracts for the work amounting to several hundred thousand dollars to the Dominion Bridge Co., the Canadian Allis-Chalmers Co. and McKinnon, Holmes & Co.

Assets of the Warren Motor Car Co., Detroit, liquidated by receiver, brought $10,942 more than the appraised valuation, the total being $130,088. Creditors will receive 5 per cent. A payment of 10 per cent has been made already and further payments are expected.

The Cleveland Wrought Washer Co., Cleveland, has increased its capital from $35,000 to $70,000.

TELL OF CONTRACTS

Made Below Ordinary Quotations—Steel Corporation Hearings.

Hearings of the Steel Corporation suit were resumed Monday morning in New York. A report of the hearings last week will be found on page 1128 of today's issue.

Oliver J. Johnson, president of the Wheeling Can Co., Wheeling, W. Va., testified Monday that his company started operations in 1903, when it purchased 30,000 boxes of tin plate. At present it buys about 300,000 boxes annually. Last Saturday he placed the contract for his company's requirements for the year 1914 with the Phillips Sheet & Tin Plate Co. In cross-examination he was asked to give the details of the contract which he made with the Phillips company in October of 1912 for 1913 requirements. He objected to giving out the prices and it was decided that the price at which the contract was made should be written down by Mr. Johnson on a piece of paper to be filed as an exhibit but to be withheld from publication. Mr. Johnson's testimony, however, developed that the price which the Phillips company first quoted him was lower than the trade paper quotations at that time, $3.60, Pittsburgh. Mr. Johnson testified as to contracts for earlier years made below the prices quoted by trade papers.

William A. Kober, Pittsburgh, purchasing agent for the H. J. Heinz Co., said that company uses about 40,000,000 cans a year. Most of these the company makes itself, buying from 75,000 to 100,000 base boxes of tin plate annually. This tin plate is bought on a basis of competitive bidding and the quotations submitted by the various concerns generally are dissimilar.

Harold H. Robertson, president of the Asbestos Protected Metal Co., Beaver Falls, Pa., which buys about 1,500 to 2,000 tons of sheet steel annually, testified that quotations of the different companies generally vary.

W. H. Foster, Youngstown, O., president of the General Fireproofing Co., testified that his company buys about 15,000 tons of sheet steel annually for use in manufacturing office furniture and fireproofing material. He said that the competition among sellers is very keen and that bids very seldom agree. He told of making various contracts at lower figures than quoted by trade papers.

Arthur W. Glessner, of the Excelsior Steel Furnace Co., which buys from 2,000 to 3,000 tons of sheets and tin plate annually, testified that there is active competition in the sale of these products.

William S. Horner, Pittsburgh district manager of the American Rolling Mill Co., Middletown, O., testified that competition between his company and other companies making similar products has been active and unrestricted.

Arthur P. Bowen, director of purchases of the Pullman Co., stated that the company purchases from 130,000 to 150,000 tons annually on a strictly competitive basis.

Zanesville Plant Operating

The American Rolling Mills Co., Middletown, O., reopened its Zanesville, O., plant on Dec. 8. About 600 men have been put to work and the mill is now being run at full capacity. The output of the Zanesville branch is sheets exclusively, as the open-hearth furnaces, blooming mills, etc., of this company are all located at the main plant at Middletown. The Zanesville plant was closed down about a month ago, following the bursting of the large fly-wheel of the engine that drove the sheet mills. This engine has since been replaced by one of 1,800 horsepower, manufactured by the Hooven-Owens-Rentschler Co., of Hamilton, O., which will be used exclusively as the sheet mill drive. The main plant of the American Rolling Mill Co. at Middletown is also being run at full capacity at the present time.

METAL MARKETS

New York

Dec. 16.

Copper.—Following a brief improvement in demand, mostly on the part of European consumers, the refined copper market is again stagnant. At present electrolytic is offered at prices equivalent to 14.12½c to 14.25c, cash New York, but consumers are but little interested in closing for their requirements. The market in casting copper continues unimproved and there is an accumulation of this metal in the market. The price of casting copper may be quoted at 13.87½c to 14c, cash, New York. But little prime lake is selling and this appears to be bringing prices equivalent to 14.87½c to 15c, cash New York.

The standard copper market during the week lost 5s, net, for spot, while the price of three months advanced 12s 6d. Today's close on the London exchange was £65 for spot and £64 17s 6d for three months. Exports of copper so far this month amount to 15,740 tons.

Tin.—There has been a comparatively good volume of buying in the tin market during the past week. A great deal of this was for delivery over the first six months of next year. Most of the business was placed by large tin plate manufacturers. The tone of the market became stronger as the week advanced and today's close, £173 for spot and £174 5s for three months, compared with £170 10s for spot and £172 for three months a week ago on the London exchange. Bid and asked quotations on the New York exchange today were 37.70c and 37.95c, compared with 37.12½c and 37.62½c a week ago. Spot may be had in New York today at 37.85c, with a premium asked for future delivery. Tin arrivals so far this month amount to 1,445 tons, while 1,599 tons are still afloat.

Spelter.—While demand for spelter continues slack and the price is unchanged, there is a better feeling prevalent among producers, who are of the opinion that the outlook has improved slightly. This improvement in sentiment is due to two factors: There has been a very sharp curtailment in the production of spelter recently, and it is believed that consumers must shortly enter the market on a larger scale. Prime western brands, in 50-ton lots, may be quoted at 5.05c to 5.15c, New York delivery.

Lead.—Following the recent cut in price by the leading producer, there has been a somewhat better show of interest among consumers. It is felt that this market is scraping bottom and the development of a better buying movement shortly would not be a surprise. A further reduction in price would undoubtedly be followed by a marked decrease in production as a good many producers are now operating without appreciable profit. The price of the leading interest is 4c, for 50-ton lots, delivered in New York, and outsiders are shading this to 3.95c.

Antimony.—Antimony has again taken a slight drop and Cookson's now is quoted at 7.40c to 7.60c and Hungarian and Chinese brands are quoted at 6.12½c and 6.25c, duty paid, New York. The price of Hallett's remains unchanged owing to a slight scarcity of the metal. Demand is dull and the market featureless.

Chicago

Dec. 15.

New Metals.—Copper prices are unsteady although nominally the quotations are unchanged. Lead is lower and spelter stationary. Western tin is weak in sympathy with New York quotations. In the copper market, all formal asking prices have been abandoned and producers are willing to entertain reasonable bids. Copper consumers apparently are holding off in the hope of obtaining 14-cent metal.

We quote dealers' selling prices f. o. b. Chicago, as follows:

Lake copper, carload lots, 14¾c; casting, 14½c; smaller lots, ¼c to ¾c higher. Spelter, car lots, 5.05c; lead, desilverized, 3.95c; sheet zinc, $7.25, f. o. b. La Salle, in carlots, of 600-pound casks; pig tin, 38c; Cookson's antimony, 8c; other grades, 6½c.

Old Metals.—The old metal situation in the west continues unsteady both from a dealer's and consumer's standpoint. No one is prepared to forecast the future course of prices. Copper and brass items are particularly weak; scrap tin is also lower.

We quote dealers' selling prices f. o. b. Chicago as follows:

Copper wire, crucible shapes, 13¾c; copper bottoms, 11¾c; heavy red brass, 12¼c; heavy yellow brass, 8¼c; No. 1 red brass borings, 10¾c; No. 1 yellow brass borings, 7¾c; brass clippings, 9c; lead pipe, 4c; zinc scrap, 3¾c; tea lead, 4c; No. 1 aluminum, 15c; No. 1 pewter, 27c; block tin pipe, 36c; tin foil, 30c; linotype dross, 3c; electrotype dross, 3c; stereotype plates, 4½c; stereotype dross, 3c.

ARGUMENTS HEARD

On Objection to Ore Carrying Rate From Michigan Mines.

Washington, Dec. 16.—"In round figures, the railroads of the country are capitalized at $18,000,000,000 and the operating expenses are in the neighborhood of $2,000,000,000," said Attorney Frank Lyon, appearing before the Interstate Commerce Commission, last Thursday, on behalf of the Newport Mining Co., and the Hayes Mining Co., in arguments in the case of those two companies and Corrigan, McKinney & Co., against the Chicago & North Western railroad et al., to protest against the charge of 45 cents for carrying ore from the mines of the northern peninsula of Michigan to the docks at Ashland, Wis., and Escanaba and Marquette, Mich. This rate also includes the service of handling on docks and placing the ore in vessels. Prior to Jan. 1, 1913, all this service was performed for 40 cents per ton. The new tariff also includes a demurrage charge of ¼ cent per ton for storage after 10 days' free time. The complaints are directed against the 5c increase for the line haul and loading.

"The burden of the song," continued Mr. Lyon, "has been that the carriers were entitled to more money for this particular business because of an alleged extraordinary capital expense at the dock. Figures presented by the carriers show conclusively there is no basis to this claim, as the operating costs and the capital costs at the dock are about evenly divided, as is true upon railroad property generally."

It was pointed out by Mr. Lyon that in 1912 at Escanaba it cost the North Western about 50 per cent more per ton to operate its dock than it did at Ashland, handling substantially the same number of tons at each port. President Gardner, of the North Western, Mr. Lyon said, testified that the effect of the new demurrage rule of 1913, penalizing ore that remained in the docks more than 10 days, has shown that the North Western had at Escanaba two more docks than were necessary.

"This means," it was declared by Mr. Lyon, "that in 1913 two docks have been doing the same service as four docks."

The total annual ore movement of the mines affected in the case to the three docks approximates 13,000,000 tons, of which the North Western carries something over 7,000,000 tons.

Exhibits showing the price of ore and the tonnages from the upper peninsula were compiled from statistics of The Iron Trade Review and used in his argument by Attorney C. C. Wright, representing the North Western, who referred to the figures as coming from an unquestioned trade authority, a fact which Mr. Lyon readily conceded. The latter said, however, that the fact that the price of iron ore had increased since the early 90's was no reason why the North Western should absorb increased revenue.

Mr. Lyon laid considerable stress on the fact that the railroads have effected great economies by reason of increased efficiency through added motive power, and larger cars. He pointed out that in the handling of ore in 1912 of 50 per cent more tons than in 1902, it required 20 per cent fewer cars, while the average load in the car increased 92 per cent and the tare weight of the car only 6 per cent. The per cent of paying load in 1902 was declared to be 66 and in 1912, 78, an increase of 18 per cent. Many figures were produced to prove that the earnings on carrying ore were greatly in excess of the average earnings on other commodities.

Attorneys for Corrigan, McKinney & Co. argued largely along the lines laid down by Mr. Lyon, with amplifications.

Attorney Wright, for the North Western, took the chief burden of justifying the increase. Alluding to what he called the enormous service involved, he said that with the 5-cent increase the charge is very low and will in no instance more than absorb the added cost of labor, material and maintenance. The 45-cent rate, he emphasized, is for ore which is to move from the docks, leaving the old 40-cent rate applicable to the furnaces at the upper docks, which, he estimated, consume about 2 per cent of the total movement.

Reference was made to the old rates of $2 and $1.65, which had undergone a gradual and decided reduction until the rate of 40 cents was established in 1898. This rate was declared to be below the normal basis and was made "solely because the mine operators were in difficulties and could stand no more." The North Western's net income in Michigan on its 520 miles there, 200 miles of which are devoted to ore traffic, was declared to be only $394 per mile, equal to ½ per cent on its investment. Of its total tonnage in Michigan Mr. Wright said 76 per cent is ore traffic.

Attorney Albert H. Lossow, appearing for the Soo Line, with docks at Ashland, said that road carries 1,200,000 tons over the tracks of the Wisconsin Central, which the Soo leases. He pointed out the delay occasioned in grading and waiting for the ores, and said the Soo handles 46 grades. These operations and delays, it was contended, entail extra bookkeeping, added labor, and increased switching. It was said further that the ore business lasts only about seven months out of each year, leaving the gondolas idle the remaining five months. Like Mr. Wright he said the roads need more money and that the ore traffic justified increased charges, at the same time not being burdensome to the operators. He said also that the Soo faces the problem of financing a modern steel and concrete dock at Ashland after next year to replace its present wooden structure.

Plans Rejected.—The board of engineers of the war department at Washington have rejected the plans for a new bridge to be built across the Muskingum river, at Dresden, Muskingum county, O. to replace the suspension bridge which was washed away by the floods last March. This decision was given following a report of Major Rand, United States engineer at Cincinnati, who states that the bridge should have an additional six feet vertical clearance to that specified in the plans, and that the length should be increased to 630 feet. The rejected plans call for a steel truss bridge, but it is probable that, because of the demands of the United States government, a suspension bridge will be substituted.

The H. E. Wilcox Motor Co. has been incorporated at Minneapolis, succeeding the H. E. Wilcox Motor Car Co. Capital will be $3,500,000. The ouptut is to be motor trucks and the company is composed of men prominent in manufacturing in Minneapolis.

Officials of the McCaskey Register Co., Canton, O., deny a published report that the company had offered the government a plan of dissolution. The statement is made that the government has not asked dissolution and no such move is under consideration.

The Erie Pattern Works, Erie, Pa., management has dissolved, Jules Sanner retiring and Herman Heibel continuing the business.

A small amount of light machinery will be needed by F. R. Fribley, of Bourbon, Ind., to equip a garage and automobile repair shop.

ACTIVE DEMAND

For Track Fastenings—Eastern and Canadian Roads Buying Rails.

New York, Dec. 17. (By wire.)—The Canadian Pacific has placed 100,000 tons of rails with Algoma Steel Co. and 25,000 with the Dominion Steel & Iron Corporation.

An active demand for track fastenings of various kinds continues to be presented by the railroads, considerable of which is for contract requirements. The Southern railroad has closed for 10,000 kegs of standard spikes and a considerable quantity of tie plates. The Louisville & Nashville has placed 5,000 kegs of spikes with a Pittsburgh maker. The Seaboard Air Line inquires for 10,000 kegs for 1914 delivery, and the Norfolk & Western for 5,000 to 10,000 kegs. The Chesapeake & Ohio has taken bids on 3,000 kegs for early shipment. Standard spike prices are not over 1.50c Pittsburgh. Eastern roads are buying rails a little more actively. One eastern line practically has closed for 15,000 tons with eastern makers. Another eastern road is negotiating, the New York, Ontario & Western has closed for 5,400 tons and the New York Municipal Railways Corporation for 1,000 tons, the latter deferring action on 24,000 tons additional. The Norfolk & Western has increased its recent rail order to 29,000 tons.

Equipment orders and inquiries are coming out more freely. The Chesapeake & Ohio bought 1,000 cars in the week. The Union Pacific railroad will take bids until late in the month on its inquiry for 5,000 cars. Revised bids are being asked by the Delaware, Lackawanna & Western on 6,500 tons for terminal improvements at Buffalo, and by the Norfolk & Western on 3,000 to 4,000 tons of catenary bridges for electrification work. About 6,000 tons of additional subway work in New York City is offered.

In the west very little information is available regarding the Union Pacific's inquiry for 5,000 cars. The award of 1,000 box cars to the Haskell & Barker Car Co. by the Toledo, St. Louis & Western is officially denied. Business is scattered and shows no consistent improvement.

CAR AND LOCOMOTIVE ORDERS.

The Salt Lake & Utah R. R. has ordered three motor cars from the Hall-Scott Motor Car Co.

The Missouri Pacific has ordered 25 locomotives from the Baldwin Locomotive Works.

The Chesapeake & Ohio railroad has ordered 1,000 70-ton hopper cars from the Standard Steel Car Co., duplicationg an order of this kind placed some months ago. This road still is negotiating for 1,000 box cars.

The Louisville & Nashville railroad has ordered 18 passenger coaches of the American Car & Foundry Co.

RAIL ORDERS PLACED.

The New York, Ontario & Western railroad has ordered 5,400 tons of open-hearth rails from the Bethlehem Steel Co.

The New York Municipal Railways Corporation has placed 1,000 tons of running rails with the Bethlehem Steel Co. but has deferred action on its inquiry for 10,000 tons of running rails and 14,000 tons of conductor rails additional, for delivery during 1914 and 1915.

The Norfolk & Western has increased its recent rail order to 29,000 tons. The additional tonnage placed over that previously reported includes 11,600 tons to the Carnegie Steel Co. and 6,800 tons to the Cambria Steel Co.

CAR INQUIRIES PENDING.

The New Jersey, Indiana & Illinois railway is inquiring for 100 40-ton box cars.

The Grand Trunk is in the market for 110 passenger cars in addition to the 1,000 freight cars reported last week.

BRIDGE AND STRUCTURAL WORK.

The Delaware, Lackawanna & Western railroad, 6,500 tons for terminal improvements, Buffalo. Revised bids asked for Dec. 18.

The Norfolk & Western railroad is reviving a requirement of 3,000 to 4,000 tons of catenary bridges for electrification work at Bluefield, W. Va.

Office building, Delaware & Hudson railroad, Albany, N. Y., 1,000 tons. Bids asked.

Section No. 6, Seventh avenue subway line, New York City, 4,800 tons. Bids asked for Dec. 29.

Connecting link of elevated railroad extensions, at Lutheran Cemetery, Brooklyn, 1,000 tons. Bids asked for Dec. 22.

Wood river drainage and levee district, East Alton, Ill., six pairs of 60-foot deck girders with concrete decks, to carry tracks of C. P. & St. L. R. R. and Illinois Terminal R. R., 167 tons, to East St. Louis Bridge Co.

Minneapolis, St. Paul & Sault Ste. Marie Ry., one 100-foot through-plate girder span, Fond du Lac, Wis., 107 tons to the American Bridge Co.

The Chicago & Illinois Western Ry. Co. is inquiring for two bridges for which the steel requirements will be about 400 tons.

Will Take a Southern Trip

Counsel for the defense in the Steel Corporation dissolution suit Tuesday announced plans for a southern trip to be taken immediately after Christmas. On Jan. 5, the hearings will be resumed in Atlanta, Ga., probably at the Piedmont hotel. On Jan. 7, it is expected that witnesses will be examined in Birmingham, Ala., at the offices of the Tennessee Coal, Iron & Railroad Co., and hearings will be held in New Orleans either on Jan. 9 or Jan. 12. From there, the proceedings will be shifted to St. Louis and, later, to Chicago. It is planned to return to New York about Jan. 25, although it is possible that the trip may be extended to include some cities not now provided for.

EXTREMELY DULL

Is Structural Work in East—Quiet in Other Centers.

In New York City some indications have appeared of a better volume of structural work under development in architects' hands, but it will be some months before this reaches the market. In the meantime, conditions in the metropolitan and other eastern territories remain extremely dull.

The fabricators of the Buffalo district feel more optimistic and are more active than a week ago. The Thor Iron Works, of Toronto, secured the contract for the Toronto intake, requiring about 1,000 tons, sublet to Donald & McCall, of Montreal. Plans are expected out soon for a new hotel at Hamilton, Ont., to be started in the spring, taking 1,200 to 1,500 tons.

Western fabricators are obliged to combat the usual winter dullness, together with other adverse factors. Contracts placed in the west last week totaled 2,241 tons, including one order for 1,467 tons for a building at the San Francisco exposition. There has been a fair sprinkling of railroad business recently.

STRUCTURAL CONTRACTS PLACED.

Building for Sanitary Co. of America, Linfield, Pa., 250 tons, awarded to the McClintic Marshall Construction Co.

Finance Co. building, Philadelphia, 2,200 tons, now conceded to the American Bridge Co.

C. M. Ceaser apartment building, San Francisco, Cal., 300 tons, to the Ralston Iron Works.

M. Friedman Realty Co., apartment house, Oakland, Cal., 200 tons to the Vulcan Iron Works.

Coaling station for United States government at Pearl Harbor, Hawaii, 3,000 tons, awarded to United States Steel Products Co. and the American Bridge Co.

CONTRACTS PENDING.

Jacobs apartments, West Seventieth street, New York City, 600 tons. Bids asked.

Office building for R. G. Dun & Co., to be erected in Brooklyn, 500 tons. Project abandoned.

Bridge for Pennsy

New York, Dec. 17. (By wire.)—The Pennsylvania railroad has asked bids, to close Jan. 14, on a two-track, six-span bridge over the Delaware, near Trenton, which it is estimated will require 4,000 to 5,000 tons of steel at least.

The Republic Iron & Steel Co. is preparing to reline and improve its No. 1 furnace at Thomas, Ala. A new tipple and washer at Palos mine, in the same section, are to be built.

OBITUARIES

David A. Harris, Johnstown, Pa., aged 70 years, is dead. For 39 years he was employed by the Cambria Iron Co., for 24 years being chief clerk in the time office.

Dwight Arven Jones, president of the St. Joseph Lead Co. and the Doe Run Lead Co., died in St. Louis on Dec. 7, aged 59. He has journeyed there to effect the consolidation of these two companies.

George S. Brown, manager of the Bristol Brass Co., Bristol, Conn., died Dec. 8 of apoplexy at his home in New Britain, Conn., at the age of 62 years. Mr. Brown was a Yale graduate of the class of 1874.

Thaddeus S. Weed, Chester, Pa., is dead, aged 55. With his father, Charles A. Weed, now deceased, he operated the Combination Steel & Iron Co., now the Duplex Metal Co., maker of steel rails and blooms.

Timothy Cruice, president of the Wisconsin Brass Foundry, 711-713 South Pierce street, Milwaukee, was accidentally killed at Alton, Ill., on Dec. 13, while attempting to board a train for Milwaukee. He was 61 years old and a native of New York state, whence he went 40 years ago to Milwaukee.

Lewis W. Hagenman, formerly assistant superintendent of the Reading Iron Co., said to be the oldest man in Reading, Pa., is dead from a fracture of the hip. He was active until a fortnight ago when he fell and received the injury. He is said to have been the first man in Berks county to cut a nail.

William Deering, Chicago, founder of the Deering Harvester Co., died at his winter home in Miami, Fla., Dec. 10 aged 87 years. The company was formed in 1870 as Gammon & Deering, Mr. Gammon later selling his interest. The plant was removed from Plano, Ill., to Chicago in 1874 and in 1902 was merged with the International Harvester Co.

Professor Alfred C. G. Compton, formerly head of the physics department of the College of the City of New York, died Dec. 12 at New York City, aged 58 years. He was the author of various mechanical books, including "First Lessons in Metal Working", "The Speed Lathe", and "The Engine Lathe". He was a member of the American Society of Civil Engineers and the American Institute of Electrical Engineers.

Sydney Wright Hopkins, prominent in the financial and general business fields, died at New York Dec. 12, at the age of 77 years. He was president since 1907 of the Trojan Car Coupler Co. of New York. In 1860 he and his father established the firm of E. A. & S. W. Hopkins, dealers in railroad supplies and securities, which was dissolved in 1874. This firm financed a number of railroad propositions and also the People's Gas & Coke Co. of Chicago.

John Harding Page Wharton, 44 years old, died last week at Baltimore, Md. He was born in Pittsburgh. In 1909, he became assistant general manager of sales in charge of the tubular goods department for the Republic Iron & Steel Co., Youngstown, and was connected with that interest several years. At one time, Mr. Wharton was connected with the National Tube Co., and, before becoming associated with the Republic company, was with La Belle Iron Works, Steubenville, O.

Joseph M. Duclos, one of the oldest architects and builders in the metropolitan district, died at his home in Brooklyn recently, aged 81 years. He was a resident of France and when he came to this country many years ago, he entered the employ of the Architectural Iron Works, in Manhattan. Later he established and managed the East River Iron Works, New York, and while associated with this firm, superintended the construction of some of New York's greatest buildings. He retired some years ago.

Frank Turner Moorehead, 56 years old, a member of the brokerage firm of James D. Dyer & Co., Pittsburgh, and well known in the iron and steel trade in that district, died Dec. 15, at the Allegheny general hospital, following a brief illness from pneumonia. He was the eldest son of John Moorehead, a pioneer pig iron manufacturer. After being graduated from Yale, in 1878, Mr. Moorehead became identified with the firm of Moorehead, Bro. & Co., Inc., owners of the Vesuvius Iron Works, Sharpsburg, Pa., and remained with that interest until about 1900. His brother, John Moorehead Jr., is president of the Moorehead company.

Another Boat Ordered

The Mahoning Steamship Co., of Cleveland, gave a contract on Thursday last to the Great Lakes Engineering Works, Detroit, for a bulk freighter to replace the Charles S. Price, which was lost in the big November gale on Lake Huron. The new steamer will be 524 feet over all, 504 feet keel, 54 feet beam and 30 feet deep, and is promised for delivery May 1 next.

MORE SELLING

In English Pig Iron Market—Stocks Still Declining.

The more active selling movement of English foundry and steel-making irons, principally for delivery on the continent, which was reported a week ago, is being continued, according to advices received from abroad. Pig iron stocks in England also continue steadily to decline. Stores of iron in the Middlesbrough district on Dec. 1 were 148,595 tons, a decrease of 2,004 tons in the week and 93,028 tons in the year to date. In the Cumberland district, stocks fell off sharply in the week ending Dec. 4, the loss being 1,273 tons. This brings the total stocks in that district to 9,068 tons, a decline in the year of 27,355 tons. Furnaces blowing in the Middlesbrough district on Dec. 4 numbered 77, a loss of two from the preceding week and of 10 from the corresponding date a year ago. In the Cumberland district, the active list was 24, the same as the preceding week and as compared with 26 on the corresponding date in 1912. Scotland furnace operations showed an increase of one in the week to a total of 76. On the corresponding date last year 89 furnaces were blowing. A summary of the stock conditions in the Middlesbrough and Cumberland districts in recent weeks with the number of furnaces blowing shows the following:

MIDDLESBROUGH DISTRICT.

		Stocks.	Furnaces.
Dec.	4	148,595	77
Nov.	27	150,599	79
Nov.	20	151,233	79
Nov.	13	152,372	81
Nov.	6	156,415	81
Oct.	30	158,281	81
Oct.	23	164,837	81
Oct.	16	167,099	81
Oct.	9	168,474	81
Oct.	2	170,848	81
Sep.	25	171,887	83
Sep.	18	175,803	85
Sep.	11	179,360	88
Sep.	4	183,140	89
Aug.	28	187,269	..
Jan.	1	241,623	..

CUMBERLAND DISTRICT.

		Stocks.	Furnaces.
Dec.	4	9,068	24
Nov.	27	10,341	24
Nov.	20	10,891	24
Nov.	13	11,131	24
Nov.	6	11,240	24
Oct.	30	12,025	26
Oct.	23	12,889	26
Oct.	16	13,189	26
Oct.	9	13,899	26
Oct.	2	16,968	25
Sep.	25	17,720	25
Sep.	18	18,181	24
Sep.	11	18,829	24
Sep.	4	19,601	24
Aug.	28	19,761	..
Jan.	1	36,423	..

The Board of Public Affairs of Celina, O., will open bids on Dec. 16, for a large amount of electrical equipment, including one 170 kilowatt generator.

IRON AND STEEL PRICES

Pig Iron

PITTSBURGH

(Through This Year and First Half 1914.)

Bessemer	$15.90
Basic	13.65
No. 2 foundry	14.40 to 14.65
Malleable	14.40 to 14.65
Gray forge	13.90

(The freight from valley points is 90c.)

CLEVELAND

(Through First Half 1914, Delivered in City.)

No. 1 foundry	$14.25 to 14.75
No. 2 foundry	13.75 to 14.25
No. 2 southern	13.35
Bessemer	15.90
Silveries, 8 per cent silicon	18.55

CINCINNATI

(Prompt and First Half.)

Southern foundry No. 1	$14.25 to 14.75
Southern foundry No. 2	13.75 to 14.25
Southern foundry No. 3	13.25 to 13.75
Southern foundry No. 4	13.00 to 13.50
Southern gray forge	12.75 to 13.25
Mottled	12.75 to 13.00
Southern No. 1 soft	14.50 to 15.00
Southern No. 2 soft	14.00 to 14.50
Southern Ohio No. 2	14.20 to 14.70
Southern Ohio No. 3	13.70 to 14.20
Southern Ohio No. 4	13.45 to 13.95
Silveries, 8 per cent silicon	17.70 to 18.20

(Freight from Ironton, $1.20; from Birmingham, $3.25.)

CHICAGO

(Delivered Chicago, until July 1, 1914, except northern foundry and malleable Bessemer, which are quoted f. o. b. local furnace.)

Lake Superior char., No. 1 to 4	$15.50
Northern foundry No. 2	14.50
Southern foundry No. 2	15.35
Jackson Co. silveries, 3 per cent	16.85
South'n silveries, 5 per cent sil.	16.85
Alabama basic	15.35
Malleable	14.50

PHILADELPHIA

(Prompt and first half shipment delivered to consumer's plants in Philadelphia and vicinity, unless otherwise specified.)

Northern No. 1X foundry	$15.50 to 15.75
Northern No. 2X foundry	15.00 to 15.50
Northern No. 2 plain	14.75 to 15.00
Standard forge (Eastern Pa.)	14.50 to 14.75
Virginia No. 2	15.80
Southern No. 2	15.00 to 15.50
Standard low phos., Phila.	20.75 to 21.50
Lebanon low phos., furnace	17.50 to 18.00
Malleable	15.00 to 15.50
Basic (Eastern and Central Pa.)	15.00
Middlesbrough, English No. 3 (on dock)	14.25 to 14.50

NEW YORK

(Prompt and first half delivery, prices based at Jersey City and at Jersey points near tidewater.)

Northern No. 1X foundry	$15.25 to 15.50
Northern No. 2X foundry	14.75 to 15.25
Northern No. 2 plain	14.50 to 14.75
Virginia No. 2X	15.80
Southern No. 2	14.75 to 15.25
Malleable	14.50 to 15.00
Gray forge	14.25 to 14.50

ST. LOUIS

(Throughout This Year.)

Southern No. 1	$15.25 to 15.75
Southern No. 2	14.75 to 15.25
Southern No. 3	14.25 to 14.75
Southern No. 4	13.75 to 14.25

(Freight, Birmingham to St. Louis, $3.75.)

BIRMINGHAM

(For Southern Delivery.)

No. 1 foundry	$11.50 to 12.00
No. 2 foundry	11.00 to 11.50
No. 3 foundry	10.75 to 11.00
No. 4 foundry	10.50 to 10.75
Gray forge	10.50 to 10.75
Mottled	10.25
Standard basic	11.00 to 11.50
Off basic	10.50 to 11.00
Charcoal	25.00

BUFFALO

(Delivered in city over remainder of year and first quarter of 1914.)

No. 1 foundry	$13.50
No. 2X foundry	13.25
No. 2 plain	13.00
No. 3 foundry	13.00
Gray forge	13.00
Malleable	13.00 to 13.25
Basic	13.25 to 13.50

Ferro Alloys

English 80 per cent ferro manganese, prompt and forward delivery, $47, seaboard.

Fifty per cent ferro-silicon on contracts, $75, Pittsburgh, or Philadelphia, for carloads; $74 for larger lots, and $73 for 600 tons or more. Twelve to 13 per cent, $23. Eleven to 12 per cent, $22. Ten to 11 per cent, $21. Nine to 10 per cent, $20, f. o. b. Globe, Jisco, and Ashland furnace. Freight to Pittsburgh, $1.90.

Ferro-carbon titanium 8 cents per pound for carload lots; 10 cents per pound for 2,000-pound lots and over; 12½ cents per pound in lots up to 2,000 pounds.

Freight rates on ferro-manganese, foreign spiegeleisen and electrolytic ferro-silicon from Baltimore to Pittsburgh, $2.16; to Youngstown, $2.48; to Cleveland, $2.57; to Detroit and Columbus, $2.99; to Cincinnati, $3.40; to Chicago and Milwaukee, $4.00. Freights from Philadelphia and New York, 10 to 30 cents higher, respectively.

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 pounds, to:—

New York	16 cents
Philadelphia	15 cents
Boston	18 cents
Buffalo	11 cents
Cleveland	10 cents
Cincinnati	15 cents
Chicago	18 cents
Denver	84½ cents
St. Louis	22½ cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast, shapes and plates	80 cents

Coke

AT THE OVENS.

	Prompt shipment.	Contract.
Connellsville district:		
Foundry coke	$2.50 to 2.75	$2.50 to 2.75
Furnace coke	1.70 to 1.85	1.80 to 2.00
Wise county district:—		
Foundry coke	$2.50 to 3.10	$2.65 to 3.10
Furnace coke	2.10 to 2.25	2.25 to 2.50
Pocahontas district:—		
Foundry coke	$2.50 to 3.00	$2.50 to 3.00
Furnace coke	2.00 to 2.40	2.15 to 2.60
New River district:—		
Foundry coke	$2.85 to 3.50	$2.85 to 3.50
Furnace coke	2.50 to 2.75	2.50 to 2.75

Iron Ore

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer prices are: Old range Bessemer, $4.40; Mesabi Bessemer, $4.15; old range non-Bessemer, $3.60; Mesabi non-Bessemer, $3.40; all at lower lake ports.

Foreign iron ores, 7½ to 8 cents per unit, f. o. b. cars eastern seaboard. Freight rates from Philadelphia to eastern Pennsylvania furnace points range from 35 to 75 cents per ton.

Semi-Finished Material

PITTSBURGH

Bessemer 4 x 4 billets with 0.25 carbon and less, $20.00; open-hearth rolling billets, $20.00; Bessemer sheet bars, $21.00; open-hearth sheet bars, $21.00, f. o. b. makers' mill. Forging billets, $24 to $25, Pittsburgh. Wire rods, $25.50; muck bar $29, Pittsburgh.

PHILADELPHIA

Delivered to consumers' plants in Philadelphia and vicinity: 4 x 4-inch open-hearth and Bessemer, rolling billets at $21.50 to $22.50, and forging billets at from $26.50 to $27.50; muck bar, $28.00 to $30.00.

Standard Shapes

PITTSBURGH

Standard structural shapes, 1.25c. For extras see card of Sept. 1, 1909.

CHICAGO

Standard structural shapes, 15 inch and under, 1.38c to 1.43c.

PHILADELPHIA

Standard structural shapes, base sizes, delivered to consumers' plants in Philadelphia and vicinity, 1.35c to 1.40c.

NEW YORK

Standard structural shapes, base sizes, delivered in metropolitan district, 1.36c to 1.41c.

Plates

PITTSBURGH

Standard steel plates ¼ inch thick, 6¾ to 100 inches, 1.15c to 1.20c. For extras, see card of Sept. 1, 1909.

CHICAGO

Tank plates, 1¼ inches thick, 6¾ to 100 inches wide, 1.33c to 1.38c.

PHILADELPHIA

Tank plates, base sizes, delivered to consumers' plants in Philadelphia and vicinity, 1.35c to 1.40c.

NEW YORK

Tank plates, base sizes, delivered in the metropolitan district, 1.36c to 1.41c.

Sheets and Tin Plate

PITTSBURGH

No. 28 black	1.85c to 2.00c
No. 28 tin mill black	1.85c to 1.95c
No. 28 galvanized	2.85c to 3.00c
No. 10 blue annealed	1.35c to 1.45c
No. 28 painted corrugated	2.10c to 2.20c
No. 28 galvanized, corrugated	3.00c to 3.10c
Tin plate, 100-pound cokes	$3.40

PHILADELPHIA

Delivered to consumers' plants in Philadelphia and vicinity: No. 10 gage annealed sheets at 1.60c to 1.65c.

Pipe and Boiler Tubes

PITTSBURGH

	Black Butt-Weld.	Galv.
Steel, ¾ to 3 inches	80	71½
Iron, ¾ to 2½ inches	70	61
	Lap-Weld.	
Steel, 2½ to 4½ inches	79	70½

BOILER TUBES

Steel, 3½ to 4½ inches	69	..
Iron, 3½ to 4½ inches	58	..

Other sizes of pipe and tubes take the usual advances as per official cards.

Rails and Track Material

PITTSBURGH

Steel rails, 50-pound and heavier, 1.25c per pound for Bessemer and 1.35c for open-hearth, carload lots; less than 500 tons, 1.35c per pound; light rails on base weight of 40 to 45 pounds, 1.25c, schedule on the other weights being irregular and subject to negotiations; angle bars for standard sections, 1.50c base, Pittsburgh; track bolts, 2.00c base, Pittsburgh.

Railroad spikes, 4½, 5 and 5½ and 9-16 inch, 1.50c to 1.55c.

CHICAGO

Light rails, carloads 25 to 45-pound, 1.25c; base; 16 to 20-pound, 1.30c; 12-pound, 1.35c; 8-pound, 1.40c.

Light section relayers, 45 pounds and under, subject to inspection, $21.50 to $22.50; standard section relaying rails, subject to inspection, $23 to $24.

Track fastenings, f. o. b. Chicago:

Angle bars, 1.50c; railroad spikes, 1.50c to 1.55c; smaller size spikes, 1.85c base; track bolts with square nuts, 2.10c to 2.20c.

Bars, Hoops and Bands

PITTSBURGH

Common iron bars, 1.40c to 1.45c, Pittsburgh; Bessemer and open-hearth steel bars, 1.20c; plow and cultivator, 1.20c; channels, angles, zees, tees, under 3 inch 1.30c, all f. o. b. mill.

Hoops in carload lots, 1.40c, Pittsburgh; in less than carload lots, 1.45c; bands, 1.20c base, with net extras as per standard steel.

Cold rolled and ground shafting, 63 per cent off in carloads and 58 per cent in less than carloads delivered in base territory.

CHICAGO

Bar iron, 1.15c to 1.20c; hard steel bars rerolled, 1.35c; soft steel bars, bands and small shapes, 1.38c to 1.43c; hoops, 1.53c; smooth finished machinery steel, 1 inch and larger, 1.73c; shafting, 63 per cent off list for carload lots, 58 per cent off for less than carloads.

PHILADELPHIA

Delivered in consumers' plants in Philadelphia and vicinity: Steel bars, 1.45c to 1.50c on contract and common bar iron, 1.25c to 1.35c. Cut nails, 1.80c to 1.90c, Philadelphia. Shafting, 62 and 60 off in carloads and 57 and 55 off in less than carloads in base territory.

NEW YORK

Soft steel bars delivered in the metropolitan district, 1.36c to 1.41c; common iron bars, 1.25c to 1.30c.

Bolts, Nuts and Rivets

Rivets

Button head structural rivets, 1.70c to 1.75c, Pittsburgh; cone head boiler rivets, 1.80c to 1.85c. Small rivets, 80 and 10.

Structural rivets, Chicago, 1.85c; boiler rivets, 0.10c extra.

Bolt and Nut Discounts

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, small and shorter, rolled threads, 80 and 2½; cut threads, 75 and 17½; larger and longer, 70, and 15.

Machine bolts with hot pressed nuts, ⅜ x 4 inches, smaller and shorter, rolled 80 and 7½; cut, 80 and 2½; larger and longer, 70, 10 and 10.

Gimlet and cone point lag or coach screws, 80 and 20.

Hot pressed square, blank or tapped nuts, $6.00 off list; hot pressed hexagon blank or tapped, $6.70.

Cold pressed C. & T. square, blank, or tapped, $3.80 off; hexagon, blank or tapped, ⅜ inch and larger, $6.80 off; ½-inch and smaller, $7.40.

Wire Products

PITTSBURGH

Wire nails, jobbers' carload lots, $1.55 to $1.60; retailers' carload lots, $1.60 to $1.65; cut nails (western makers) jobbers' lots, $1.60; painted barb wire, jobbers' carload lots, $1.55 to $1.60; retailers' carload lots, $1.60 to $1.65; plain wire to jobbers in carloads, $1.35 to $1.40; and to dealers in carloads, $1.40 to $1.45; polished staples, $1.55 to $1.60; galvanized staples, $1.95 to $2.00.

CHICAGO

Wire nails, jobbers' carload lots, $1.73; retailers' carload lots, $1.78; retailers' less than carload lots, $1.83; painted barb wire, jobbers' carload lots, $1.73; retailers' carload lots, $1.78; retailers' less than carload lots, $1.83, with 40c for galvanizing; plain wire, jobbers' carload lots, $1.53; retailers' carload lots, $1.58.

Cast Iron Pipe

CHICAGO

Four-inch water pipe, $26.50; 6 to 12 inches, $25.50; larger sizes, $23.50; gas pipe, $1 a ton higher.

NEW YORK

Six-inch pipe, 30 pounds to the foot, $22.00 to $23.00, f. o. b. New York, in carload lots.

BIRMINGHAM

Water mains, 4-inch, $22.50; 6-inch and up, $19.50. Gas main: $1 per ton higher than water main. Special fittings, $47.50 to $52.50.

Old Material

PITTSBURGH

(Gross Tons Delivered.)

Heavy melting scrap	$10.75 to 11.25
Rerolling rails	13.50 to 14.00
Malleable	10.50 to 10.75
Bundled sheet scrap	6.00 to 6.50
Iron axles	22.00 to 23.00
Old iron rails	13.00 to 13.50
Stove plate	8.50 to 9.00
No. 1 wrought scrap	11.50 to 12.00
Old car wheels	11.00 to 11.50
Low phosphorus	14.25 to 14.50
Machine shop turnings	6.25 to 6.50
No. 1 busheling	8.50 to 9.00
Cast borings	7.50 to 7.75
No. 1 cast scrap	11.00 to 11.50

PHILADELPHIA

Gross tons delivered to consumers' plants, in eastern Pennsylvania and western New Jersey:

Old iron rails (nominal)	$15.50 to 16.00
Old steel rails (rerolling)	12.00 to 12.50
No. 1 heavy melting steel	9.75 to 10.00
Old car wheels	12.00 to 12.50
Old iron axles (nominal)	20.00 to 21.00
Old steel axles	15.75 to 16.25
No. 1 railroad wrought	12.75 to 13.00
Wrought pipe	9.00 to 9.50
Cast borings	7.50 to 7.75
Machine shop turnings	7.00 to 7.50
Heavy cast (broken)	12.50 to 13.00
Malleable	9.50 to 10.00
Stove plate	9.00 to 9.50
No. 1 forge	7.50 to 8.00
Low phosphorus	14.00 to 14.50

Freight rates per ton on scrap from Philadelphia to principal eastern consuming points are: $0.60 to Ivy Rock, Pa.; $0.65 to Phoenixville, Pa.; $0.80 to Coatesville, Pa.; $0.85 to Bethlehem, Pa., Reading, Pa., and Roebling, N. J.; $1.10 to Pottsville, Pa., Lebanon, Pa., and Columbia, Pa.; $1.20 to Harrisburg, and Steelton, Pa.; $1.40 to Milton, Pa.

CLEVELAND

Gross Tons

Old iron rails	$12.50
Old steel rails (under 3 ft.)	12.00 to 12.50
Old steel rails (over 6 ft.)	11.25 to 11.75
Relaying rails	23.00 to 25.00
Old steel boiler plate	8.00 to 8.50
Malleable iron (railroad)	10.50 to 11.00
Axle turnings	6.00 to 6.50
Steel axles	16.00 to 16.50
Malleable iron (agricultural)	8.00 to 8.50
Heavy steel	9.25 to 9.75
Country mixed steel	8.00 to 8.50
Bundled sheet scrap	6.50 to 7.00

Net Tons

No. 1 R. R. wrought	$9.50 to 10.00
No. 1 busheling (new)	8.00 to 8.50
No. 1 busheling (old)	7.75 to 8.00
No. 1 machine cast	10.50 to 11.00
No. 1 dealers' wrought	8.00 to 8.50
Machine shop turnings	4.00 to 4.50
Pipes and flues	7.00 to 7.50
Wrought drillings	4.00 to 4.50
Cast borings	5.00 to 5.50
Stove plate	8.00 to 8.25
Wrought iron arch bars (nom.)	13.00
Wrought iron piling plate (nom.)	13.00

CHICAGO

(Delivered in consumers' yards.)

Gross Tons

Old car wheels	$11.25 to 11.75
Rerolling rails (5 ft. and over)	11.25 to 11.75
Old steel rails (3 ft. and und.)	10.25 to 10.75
Frogs, switches and guards	9.00 to 9.50
Heavy melting steel	9.00 to 9.50
Shoveling steel	8.00 to 8.50

Net Tons

No. 1 R. R. wrought	$ 8.50 to 9.00
No. 2 R. R. wrought	7.50 to 8.00
Arch bars and transoms	12.00 to 12.50
Knuckles, couplers and springs	9.00 to 9.50
Shafting	13.00 to 13.50
Iron car axles	17.00 to 17.50
Steel car axles	12.25 to 12.75
Locomotive tires	10.50 to 11.00
Cut forge	7.50 to 8.00
Pipe and flues	6.50 to 7.00
No. 1 cast	10.00 to 10.50
No. 1 busheling	7.00 to 7.50
No. 2 busheling	5.50 to 6.00
No. 1 boiler cut	7.00 to 7.50
Boiler punchings	9.50 to 10.00
Cast borings	3.75 to 4.25
Machine shop turnings	4.00 to 4.50
Agricultural malleable	8.50 to 9.00
Railroad malleable	9.00 to 9.50
Angle bars, splices, etc., iron	11.75 to 12.25
Angle bars, steel	7.50 to 8.00
Stove plate and light cast scrap	8.75 to 9.25

NEW YORK

Gross tons, New York dealers' prices at tidewater, usually for eastern Pennsylvania delivery:

Old car wheels (nominal)	$10.00 to 10.50
Heavy steel axles	14.00 to 14.50
Steel shafting	12.00 to 12.50
No. 1 heavy melting steel	7.75 to 8.00
No. 1 R. R. wrought	10.75 to 11.00
Wrought pipe (not galvanized)	6.00 to 6.25
Cast borings	4.75 to 5.00
Machine shop turnings (nominal)	4.50 to 4.75
Heavy cast	10.00 to 10.50

Stove plate	6.50 to 7.00
Grate bars	6.25 to 6.75

Freight rates on scrap per ton to Steelton, Pa., Columbia, Pa., Pottsville, Pa., and Harrisburg, Pa., are $1.50 from Jersey City, and $2.00 from New York; to Coatesville, Pa., Ivy Rock, Pa., Phoenixville, Pa., and Reading, Pa., $1.50 from Jersey City, and $1.80 from New York; to Bethlehem, Pa., $1.10 from Jersey City, and $1.60 from New York; to Roebling, N. J., $1.10 from Jersey City, and $1.50 from New York; to Milton, Pa., $1.60 from Jersey City, and $2.00 from New York; to Jersey City, $1.00 from New York; to Newark, N. J., $1.10 from New York.

CINCINNATI

Gross Tons

Old iron rails	$11.00 to 11.50
Old steel rerolling	9.50 to 10.00
Old iron axles	15.50 to 16.00
Heavy melting scrap	8.50 to 9.00
Relaying rails	18.50 to 19.00

Net Tons

Old No. 1 R. R. wrought	$ 8.50 to 9.00
Bundled sheet scrap	4.50 to 5.00
No. 1 yard wrought	6.50 to 7.00
No. 1 machine cast	9.50 to 10.00
No. 1 busheling	6.00 to 6.50
Stove plate	6.75 to 7.25
Machine shop turnings	4.00 to 4.50
Cast borings	4.00 to 5.00
Heavy turnings	5.00 to 5.50
Mixed cast	7.50 to 8.00
Breakage	5.00 to 6.00
Malleable	6.50 to 7.00

BIRMINGHAM

Old iron axles (light)	$15.00 to 15.50
Old steel axles (light)	15.00 to 15.50
Old iron rails	12.50 to 13.50
No. 1 R. R. wrought	12.00 to 12.50
No. 2 R. R. wrought	10.00 to 10.50
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	8.50 to 9.00
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.50 to 11.00
Standard car wheels	12.00 to 12.50
Tram car wheels	10.50 to 11.00
Light cast and stove plate	8.00 to 8.25

BUFFALO

Gross Tons

Heavy melting steel	$ 9.75 to 10.50
No. 1 R. R. and mch. cast scrap	12.00 to 12.50
No. 1 R. R. wrought scrap	12.00 to 12.50
Old steel axles	17.00 to 17.50
Old iron axles	22.50 to 23.00
Car wheels	11.75 to 12.25
Railroad malleable scrap	11.00 to 11.50
Machine turnings	5.00 to 5.50
Heavy axle turnings	8.00 to 8.75
Cast iron borings	5.50 to 6.00
Low phos. steel scrap	16.50 to 17.00
Old iron rails	15.00 to 15.50
Boiler plate sheared	11.50 to 12.00
Bundled sheet scrap	6.50 to 7.00
Stove plate (net ton)	9.75 to 10.00
Locomotive grate bars	9.50 to 10.00
No. 1 busheling scrap	9.00 to 9.50
No. 2 busheling scrap	7.00 to 7.50
Wrought pipe	8.50 to 9.00

ST. LOUIS

(Dealers' buying prices.)

Gross Tons

Old car wheels	$10.25 to 10.75
Old iron rails	11.00 to 11.50
Re-rolling rails (5 ft. and over)	10.50 to 11.00
Old steel rails (3 ft. and und.)	9.00 to 9.50
Light sec. relayers (45 pounds and und.) subject to inspec.	23.00 to 23.50
Relaying rails, subject to inspec.	23.00 to 23.50
Frogs, switches and guards	8.50 to 9.00
Shoveling steel	8.00 to 8.50

Net Tons

No. 1 railroad wrought	$7.00 to 7.50
No. 2 railroad wrought	6.50 to 7.00
Arch bars and transoms	11.00 to 11.50
Knuckles, couplers, springs	8.00 to 8.50
Shafting	12.50 to 13.00
Steel car axles	11.00 to 11.50
Iron car axles	13.50 to 14.50
Locomotive tires	9.00 to 9.50
Pipe and flues	5.00 to 5.50
Tank iron and cut boilers	5.00 to 5.50
No. 1 cut busheling	7.00 to 7.50
Cast iron borings	2.00 to 2.50
Machine shop turnings	3.00 to 3.50
Railroad malleable	6.50 to 7.00
Agricultural malleable	5.00 to 5.50
Stove plates	6.00 to 6.50
Angle splice bars (iron)	9.00 to 9.50
Angle splice bars (steel	7.00 to 7.50

Store Prices

CINCINNATI

Steel bars, 1.75c to 1.90c; iron bars, 1.70c to 1.80c; plates and shapes, 1.85c to 2c; sheets, blue annealed, No. 10, 2.05c to 2.10c; black No. 28, 2.55c; galvanized, No. 28, 3.65c; cold rolled shafting, round, square, hexagon and flat, 55 to 58 off.

CLEVELAND

Steel bars, 1.85c; plates and shapes, 2.00c; iron bars, 1.85c; sheets, No. 10 blue annealed, 2.15c; No. 28 black, 2.60c; No. 28 galvanized, 3.60c.

CHICAGO

Steel bars, 1.75c; iron bars, 1.75c; hoops, 2.25c; shapes and plates, 1.85c; No. 10 blue annealed sheets, 2.05c, black, No. 28, 2.65c; galvanized, No. 28, 3.65c to 3.70c.

PHILADELPHIA

Steel bars, 1.85c to 1.90c; structural shapes, 1.85c to 1.95c; plates, 1.85c to 1.95c.

NEW YORK

Steel bars, 2.00c; structural shapes, 2.05c; plates, 2.05c.

CAUTIOUS POLICY

To be Followed in Contracts—Car Builder Buys Material.

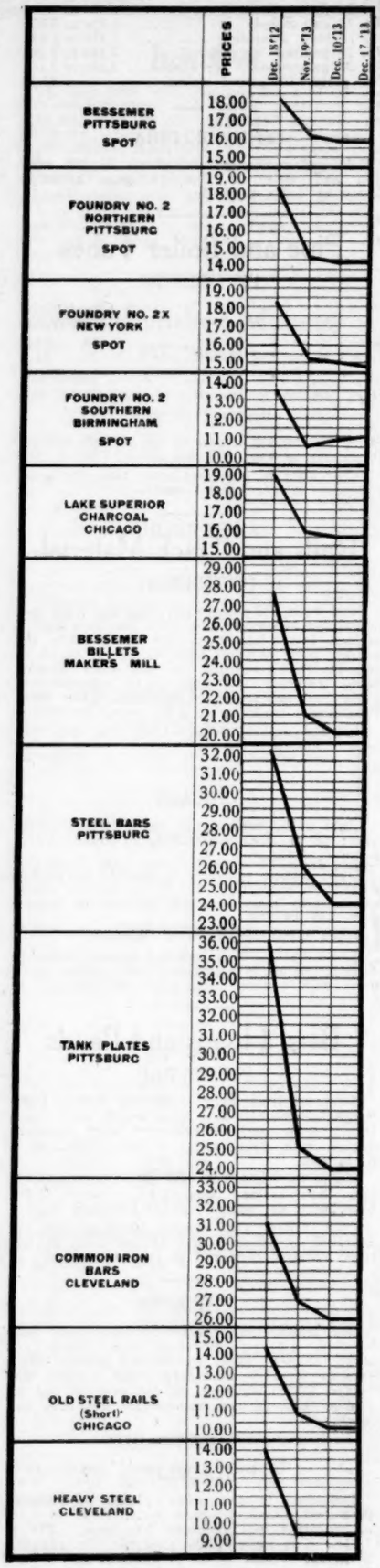
New York, Dec. 17. (By wire.)—Some larger steel makers are taking a firm position not to make forward contracts in the heavier lines at current prices and will only sell on specified quantities for first quarter. They are holding their minimum at 1.20c, Pittsburgh, on plates, shapes and bars. Sentiment continues to be more favorable in various lines and in some directions new business has increased, but the volume has not been very large as yet.

A leading Pittsburgh steel car builder has bought about 15,000 tons of plates, shapes and bars, which were divided between the United States Steel Corporation and independent makers. Some of this tonnage, it is reported, has gone at 1.15c and some at 1.20c, Pittsburgh.

Improvement in trade conditions in Germany and Belgium continues and steel prices gradually are strengthening. Some makers express the opinion that the turn in these materials has come. Scotch pig iron is firmer and higher and Middlesbrough warrants have advanced.

W. P. Palmer, president of the American Steel & Wire Co., recently inspected the new plant at Fairfield, Ala.

PRICE CHART



RED AND GREEN LIGHTS

Regulated Length of Speeches at Safety and Sanitation Conference.

In connection with the International Exposition of Safety and Sanitation, there was held a safety and sanitation conference under the auspices of the American Museum of Safety. This was held at the Chemists' Club, 50 East Forty-first street, on Dec. 10, 11 and 12. The speakers who took part were representative of practically all the important industries.

The feature of the conference was the strict adherence to the schedule by the various speakers, each of whom was allowed 10 minutes. By means of an electric fixture on the president's desk, a green light was displayed two minutes before the end of the allotted period, and a red light at the end of the 10 minutes. This innovation proved highly successful and in no case did the speakers exceed their time.

A very interesting paper by Robt. J. Young, secretary of the central safety committee of the Illinois Steel Co., described the system whereby the company has stimulated the interest of its employes in the "safety first" campaign. The central safety committee, he said, is composed of men in high authority in the company, who have the power to enforce whatever safety and sanitation measures they think advisable. In each department of the plant is a subcommittee, composed of foremen and workmen whose duty it is to keep thoroughly in touch with the manufacturing and sanitary conditions in their respective departments, and recommend to the central safety committee any changes which they deem advisable. The organization of sub-committees, said Mr. Young, does not alone apply to the Illinois Steel Co., since such sub-committees have been formed in the various mills of all of the United States Steel Corporation subsidiary companies. Thus, in the year 1912, 4,671 employes of the Corporation served on safety committees. The organization of such committees, he said, is an important factor in increasing the general efficiency of the workmen, since their interest greatly is stimulated by the work of these sub-committees.

All men hired by the Illinois Steel Co., said Mr. Young, are taken on by an employment bureau which, among other things, impresses on each employe the importance of adhering to the safety rules. Later on, the new employes are forced to undergo examinations as to their knowledge of these rules. All the foremen in the plant, he said, are required to pass this examination with a percentage of 90 or higher. An important branch of the safety work, he said, is the employment of what are known as "plant preachers," who go around among the workmen and remind them, wherever opportunities present themselves, of the safety rules. These preachers also lecture the men during noon hours on safety and sanitation matters. Safety work in the mill, said Mr. Young, largely is a matter of advertisement; dinners, lectures, moving picture shows, signs and prizes being employed to stimulate the interest of the men.

A considerable portion of a paper on "Occupational Diseases," by Dr. Alice Hamilton, Hull House, Chicago, was devoted to the subject of lead poisoning. This disease, Dr. Hamilton said, is one of the easiest in which it is possible to prove the connection between the occupation and the disease. In the matter of lead poisoning heat, humidity and fatigue play important parts, being predisposing to the poison itself. Important work in the education of employes now is being conducted, said Dr. Hamilton, with the result that lead poisoning probably will be less prevalent in the future than it is at present.

Dr. Thomas Darlington read a paper on Thursday devoted to sanitary welfare of workers. He told about the necessity of good water, fresh air, proper food, toilet facilities and working conditions in order to make possible the highest efficiency on the part of the employes.

Dr. J. B. Hileman, medical examiner of the Pennsylvania railroad, explained the medical examination of his road by which 10,000 out of an army of 70,000 applicants are weeded out annually. Dr. Irving Clark, of the Norton Co., Worcester, Mass., described the system by which employes found to have certain physical defects are placed at the kind of work where this defect will not handicap the worker. The importance of proper factory lighting, as preventive of accidents, as well as being a factor in increasing the efficiency of the worker, was emphasized in a paper by G. H. Stickney, representing the Illuminating Engineering Society. Dr. C. T. Graham-Rogers, New York state medical inspector for factories, showed a series of slides illustrating improved methods of ventilation and lighting. Other papers read were "Safer Shops," by Dr. Wm. H. Tolman; "Human Values," by Don C. Seitz; "Organized Safety on the Pennsylvania Railroad," by R. H. Newbern; "Care of Injured Employes," by Dr. Wm. O'Neill Sherman, chief surgeon of the Carnegie Steel Co.; "Industrial Plants, Their Equipment and Surroundings," by Frank E. Wallace; "Feeding of Workers," by L. H. Brittin, and "Taking Chances," by Lucian W. Chaney, of the bureau of labor statistics.

Prizes Awarded

The conference was closed on Friday night with a dinner at the Waldorf-Astoria hotel, which was presided over by Dr. John H. Finley, who was recently appointed New York state commissioner of education. Among the speakers were President Arthur T. Hadley, of Yale university; Surgeon-General Charles Francis Stokes, United States navy; Dr. William H. Tolman, director of the American Museum of Safety; and others. At the dinner, numerous medals were awarded, the presentation orator being Dr. Frederick R. Hutton, professor of mechanical engineering at Columbia university. The E. H. Harriman memorial was awarded to the Southern Pacific railroad, which has made the best record in accident prevention. During the past five years no passengers have lost their lives on that road. **The Scientific American** medal was presented to George M. Schroeder, secretary of the Welin Marine Equipment Co., for the invention of new types of lifeboats and marine life-saving equipment. The Travelers' Insurance Co.'s medal was awarded to the New York Telephone Co., because of its work in protecting its employes from injury. The Louis Seaman medal was awarded to the United States Steel Corporation for progress and achievement in the promotion of hygiene and the mitigation of occupational diseases. President James A. Farrell was on hand to receive the medal. The General Electric Co. received the Rathenau medal for having evolved the best device in the electrical industry for safeguarding industrial life and health.

The Louisville & Nashville railroad has given notice that the new rate of $1.75 per ton on pig iron from Birmingham to Mobile, ordered by the state railroad commission, will go into effect Dec. 17.

The Tennessee Coal, Iron & Railroad Co. has rented the Cunningham hospital at Ensley, Ala., and will conduct it after the first of the year.

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Summons of Business Men to Action

The address of Richard F. Grant, delivered at the Chamber of Commerce last week, is a bugle call to business men to organize for constructive effort. Liberal extracts from this notable address are published elsewhere in this issue. Mr. Grant spoke at length of the Ohio situation. But the problems of Ohio are much like those of the people of other states and the importance of business men getting together and acting earnestly and intelligently is as great in other states as in Ohio.

As Mr. Grant so well states, the time has come for business men to stop merely obstructive measures, for if they would have important influence on legislation, they must be students of events. They must frame legislation, and they must be ready to discuss measures that are proposed by others. Mr. Grant, having been a member of the state senate of Minnesota a few years ago, knows from experience how business men appear before committees. If they are active enough to take any interest at all, they often show woeful lack of knowledge of the subjects under consideration. Many of these business men have a feeling of contempt for the legislators, whom they regard as knowing much less than themselves. The truth is, however, that the legislators, in spite of all their shortcomings, represent pretty faithfully the average man and are not as lacking in intelligence and good motives as is frequently charged. Nor is the workingman always an ignoramus. Frequently he has given vastly more time and thought to public questions than has the average business man. Mr. Grant, who has frequently appeared before organizations of workingmen, knows that they can be appealed to. He has been in the habit of showing toward these organizations the same spirit of fairness manifested in his recent address. He does not claim that all the wrong is on one side and all the right on the other. He admits that liability insurance companies have done much to bring about the unsatisfactory condition of affairs, but he does not blame the companies entirely.

As to employes' compensation, much has been accomplished in other states. Reports recently submitted at the meeting of the National Founders' Association show this conclusively. Staunton B. Peck, in his address at the New York meeting, in summarizing the effects of the Illinois act, said that it eliminates the shyster lawyer and ambulance chaser and insures to the injured or their families all the money which is paid by the employer as the result of injuries; the attention of employers has been focused on the subject of accident prevention and great interest is being taken in the adoption of devices to safeguard employes from injury, and the physical examinations required by many companies have excluded from occupation men who are physically unfit to engage in them.

In all other states, except, perhaps, Washington, employers have the privilege of taking out liability insurance or of carrying their own insurance, but under the Ohio law, all except the strongest corporations will be compelled to insure under the state plan. In the case of an employe against the Standard Boiler & Plate Co., which has just been tried in the United States court at Cleveland, resulting in a verdict in favor of the plaintiff of $14,000, the court construed the words "willful act" in such a way that the number of cases in which employers will be compelled at great disadvantage to defend themselves will be largely increased and small concerns will be in danger of being made bankrupt on account of verdicts being given against them.

That the Ohio situation is serious as to the compensation law is certain. In Ohio and other states many other problems just as serious confront employers and employes and the very best methods of meeting them are pointed out in the able address of Mr. Grant.

Why a Boycotter Squirms

At the annual meeting of the National Civic Federation in New York last Friday, Samuel Gompers had a great deal to say about workingmen being oppressed by the anti-trust law. He said that it was "a shame" to think that workingmen could be indicted under the Sherman law "because they sympathized with fellow tradesmen". It is not surprising that Mr. Gompers is perturbed at the present time, because some recent decisions have shown him very clearly that the courts have no sympathy with a boycott and will do their utmost to break it up.

Important decisions were rendered recently in the

case of Irving & Casson, and that of the Paine Lumber Co., Gould Mfg. Co. and others. United States Circuit Judge Henry G. Ward decided the Irving & Casson case and United States District Judge Julius Mayer the case of the Paine Lumber Co., and others. Both of these cases involved the conspiracy of the United Brotherhood of Carpenters to exclude all open shop woodwork from buildings in New York City by declaring strikes on all buildings where such materials were used. Owing to numerous sympathetic strikes, the members of the Master Carpenters' Association of New York, constituting nearly all of the large builders in the city, were coerced into a written agreement with the United Brotherhood to use only union material. A group of local manufacturers, who have been characterized as boycott beneficiaries, agreed with the union to employ only union men, and, in turn, the union agreed to protect these manufacturers from the competition of open shops by declaring strikes against buildings where open shop material was used. These manufacturers, acting in complete harmony with the union, have employed spies to ascertain where the open shop material is being used and the information has been supplied to the union with instructions to order strikes upon the buildings in conformity with the agreement. The result of this co-operation of manufacturers and union men was to exclude substantially all non-union material from the greater part of New York City. *The New York Lumber Trade Journal,* in speaking of the situation, said:

"New York City, the greatest commercial center of the new world, conducting the greatest building operations in the world, a center of transportation by both land and sea, is as completely cut off from the benefits of free trade and competition in wood materials as if it were surrounded by a fleet of hostile ships. The potentialities of competition are found within the city itself in the form of the leading open shop trim manufacturers of Brooklyn, and not a stick of that material can be sold across the East river to the adjoining boroughs of New York. The manufacturers of the south and middle west are equally excluded. All of the builders of New York desire to purchase these open shop products, but none of them dare for fear of strikes of all trades that would tie up their building operations."

After considering this very successful industrial combination of manufacturers and union men in restraint of trade, the judges who considered the two cases came to the conclusion that the combination violated the federal anti-trust law, the state anti-trust law, the penal laws of New York and the common law.

No wonder Gompers squirms. The decisions are of great importance, not only as to the situation in New York, but on account of their bearing on the efforts of organized labor throughout the country to drive open shop products out of use. Following these decisions, it is now the duty of public officers to ask for injunctions in the name of the government, or to prosecute the conspirators criminally. It remains to be seen whether the officials will do their duty.

Plenty of Fear—But Few Facts

An immense amount of misinformation and misrepresentation is afloat nowadays in regard to the effect of the new tariff law on business. On one hand, we have the pessimist who declares that the new tariff will be most disastrous and that the present depression will deepen into paralysis, which will continue indefinitely. On the other hand, we have such people as Secretary of Commerce Redfield, and magazines and newspapers friendly to the administration declaring that the tariff is to be a blessing and that whatever unrest exists in connection with the new tariff law is artificial, has been deliberately manufactured in an attempt to discredit the national administration and is not shared by honest business interests of the country. For example, Ben F. Allen, the energetic correspondent of the *Cleveland Plain Dealer,* at Washington, announces that the administration, through the Department of Commerce, is preparing a broadside of trade figures with statements from many great producers of the country to aim at people who are characterized as "croakers" and "calamity howlers". He adds that the latest reports of exports and imports, covering July, August, September and October, the last month being the first when the new tariff was in operation, have reached Secretary Redfield and show that the predicted flooding of the American market by products of the cheap pauper labor of Europe did not happen, but imports decreased while exports made a tremendous gain. We do not see that the figures of any month of the four except October are pertinent, but the figures of the one month are of some value as showing that the imports may not be as heavy as has been feared.

The current number of *World's Work* contains an article on "How Business is Standing Tariff Reduction". Not being advised as to other lines of business, we do not know how accurate the article is in regard to such products as cotton and wool, but the statements in regard to iron and steel are about as inaccurate as they possibly could be. For example, the writer, one Arno Dosch, says that while reductions in prices of most kinds of "raw and semi-manufactured iron and steel" made during September and October were from $1 to $3 a ton, there was no sign of drop from the established price of $28 a ton on steel rails. "This," says the writer, "was partly because the railroads have been buying more heavily this fall. They are preparing for increased business and the orders they have placed with railroad equipment factories will keep them busy for the next six months." This interesting statement about the railroads is followed by the assertion that business "went forward on the basis of the new tariff as early as August". If the iron business has been going forward since August, we should like to know what going backward would be.

The truth is that very little is known as to what the ultimate effect of the new tariff law will be. All that can be said now with certainty is that fear in the minds of men of what the tariff may do has caused serious business depression and there is no evidence yet that this fear is justified.

Tells of Growth of Cambria Steel Co.

Vice President Replogle Testifies in Steel Corporation Suit — Other Witnesses Tell About Competitive Conditions

Friday of this week will be the last before the holidays on which hearings in the Steel Corporation dissolution suit will be held. On that day an adjournment will be taken till Jan. 5, in order that the special master, counsel, stenographers and their assistants, amounting in all to 20 or more individuals, may go home in peace for their Christmas dinners.

The extensive business of the Simmons Hardware Co., St. Louis, the largest concern of its kind in the country, was described on Tuesday of last week by Geo. W. Simmons, vice president and, for the past two years, acting president of the company, in the Steel Corporation dissolution suit hearing.

Of the steel Corporation subsidiaries, said Mr. Simmons, his company buys from only two, the American Steel & Wire Co. and the American Sheet & Tin Plate Co. The products which it buys from these companies, however, it also purchases from their competitors, all purchases being made on the basis of competition. In all of the products made by the Steel & Wire company and by the Sheet & Tin Plate company, there is active competition, and quotations submitted by the various competitors in these lines always have varied more or less.

Mr. Simmons was questioned with reference to the "Gary dinners," but said he had never attended any. He testified, however, that he knew of the general effect of these dinners, which was to prevent precipitate price cutting. In the fall of 1907, when the first dinner was given, said Mr. Simmons, it was generally felt among manufacturers that the uncertainty and fear of the outcome of the crucial situation would cause some one to lose his head and make big price cuts in the hope of getting business. The object of the dinner, he said, was to keep sentiment in a fairly stable condition.

"As a matter of fact there was a stability following that, was there not?" asked Judge Dickinson.

"Yes, I think so."

Julius Kahn, president of the Trussed Concrete Steel Co., with plants at Youngstown, O., and Detroit, said his company is allied with the Trussed Concrete Steel Co., Ltd., of Canada, and with a company of the same name in London. The heavy steel is bought principally from the Carnegie Steel Co., while some is bought from the Republic, Lackawanna and Inland.

Mr. Kahn mentioned the large part the Steel Corporation has had in the development of the Trussed Concrete Steel Co.'s business. The latter company tried a great many rolling mills and met with a great deal of discouragement in having its special sections made, before it enlisted the services of the Steel Corporation. Not only has the Steel Corporation rendered all possible assistance, but it has encouraged the Trussed Concrete Steel Co. to develop new sections, thus permitting the latter company to enlarge its business. The Steel Corporation furnishes all the special sections used by the Trussed Concrete company, about 20,000 tons a year. There are 30 to 40 sections, for which special rolls are required, and the latter are made by the Corporation.

Cambria Has Grown

J. Leonard Replogle, vice president and general manager of sales of the Cambria Steel Co., Johnstown, Pa., was a witness on Tuesday and Wednesday. He said he started in with the company as office boy 25 years ago.

Mr. Replogle said the Cambria Steel Co. has grown greatly since the formation of the Steel Corporation, in 1901. That year it turned out 460,000 tons of finished materials, while the output last year was 1,038,000 tons. The company now has eight blast furnaces, 28 open-hearth furnaces, four Bessemer converters, 19 finishing mills, wire plant, car shops, fabricating shops, etc. In 1901 it had six blast furnaces, six open-hearth furnaces, four Bessemer converters and eight finishing mills.

The Cambria, he said, makes about 46 to 48 cars a day, compared with a capacity of 8 to 10 at the time it originally started to build cars. The competitors of the Cambria in the sale of cars, in the order of their size, said Mr. Replogle, are the American Car & Foundry Co., Standard Steel Car, Pressed Steel Car, Pullman, Haskell & Barker, Barney & Smith, Ralston and Mt. Vernon. The Cambria, he said, as a car builder, ranks in size between Haskell & Barker and Barney & Smith. Mr. Replogle told of active competition between these various companies and he said the prices quoted on the same cars by these concerns sometimes vary as much as $80 to $100 per car. Despite the fact the Ralston, American, Standard, Pressed and Pullman companies are competitors in the sale of cars, the Cambria sells finished steel to all of these concerns.

Never in an Agreement

On 50 per cent of the cars which Cambria makes, said Mr. Replogle, steel wheels are used, these being bought from other concerns. He testified that competition in the sale of steel wheels is very keen. He also said that Cambria never has been in any agreement he knew of regarding the sales of axles and that prices as quoted by various axle manufacturers are always variable.

As commodities in the sale of which the Corporation subsidiaries and the Cambria Steel Co. compete, the witness mentioned structural shapes, plates, rails, bars, rail joints, reinforcing bars, billets, blooms, sheet bars, steel piling, wire and a few others. He also mentioned the names of other competitors in the sale of these products and described the character of their competition and th scope of the markets they reach. At all times, said Mr. Replogle, prices, as quoted by manufacturers, varied and he did not know of any so-called price agreements between them. He said that competition in the sale of these products is exceedingly active.

Works for Competitors

In reinforcing bars, said the witness, his company competes with the Lackawanna, Jones & Laughlin, Inland and Republic companies and a large number of re-rolling mills, such as Franklin, Sweet's, etc. Despite the fact that the Cambria sells steel piling, he said, it manufactures piling for the Wemlinger Steel Piling Co., New York, and assists the latter concern, as much as possible, in its sales. Mr. Replogle mentioned the Corrugated Bar Co., St. Louis, as a heavy competitor in the sale of reinforcing rods. This company, he said, has its material rolled by the Jones & Laughlin and Lackawanna. The Concrete Steel Co., New York, also does a heavy business, buying its rolled material from the Carnegie.

Ever since Mr. Replogle has been connected with the rail selling department of his company, he said, the price on standard Bessemer rails has been $28, and on open-hearth, $30. Most of the rails sold, he said, bring

higher prices than these, as a result of special refinements which the railroads specify. The Cambria, he said, gets $30.55 a ton from the Pennsylvania railroad. The Cambria, he said, offered to sell that road rails according to its specifications at $32 a ton, but after considering the matter, the railroad offered to pay $30.55 and told the Cambria to take or leave it. The result was that the Cambria met the reduced price offered by the Pennsylvania railroad. Last year, the Cambria shipped about 100,000 tons of rails to western roads, 20,000 tons of which went to the Great Northern. Owing to considerable agitation as a result of rail breakages, the Cambria took this business at a considerable price penalty in order to demonstrate the superiority of its products to the buyers, said Mr. Replogle. The price which the Great Northern paid was $30, flat, at the works, the rails being of different specifications but practically all open-hearth.

Tells of Buying Iron Mines

Joseph H. Chandler, who was attorney for H. H. Porter, conducted the negotiations ending in the purchase of the Minnesota Iron Co. and the Duluth & Iron Range railroad, in May, 1887, testified that the original road and its extensions served only the Minnesota Iron Co., but later served other mining companies as well.

F. C. Worthington, secretary and purchasing agent of the Western Wheeled Scraper Co., Aurora, Ill., said that his company buys from 15,000 to 20,000 tons of steel a year, principally plates and shapes, and these are used in the manufacture of wheeled scrapers, dragged scrapers, plows, road machinery and dump cars. The raw material, he said, generally is purchased by a yearly contract and purchases have been made from the Inland, Illinois, American Steel Hoop, Carnegie, Jones & Laughlin, International Harvester, Eastern Steel, Cambria, and occasionally, Worth and Lukens. The contracts always have been placed on a basis of competitive bidding, the bids received from the various manufacturers varying from 20 cents to $2 a ton and sometimes as high as $4 a ton.

Ralph J. Webber, vice president of the Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., said his company makes steel and wooden cars to the number of about 26 per day. It buys its raw materials, such as plates, shapes, axles, etc., in the open market and entirely on a competitive basis.

MANY DEVICES

To Promote Safety and Sanitation on Exhibition in New York.

The largest collection of industrial safety and sanitation devices ever shown in this country now is on view at the First International Exposition of Safety and Sanitation at the Grand Central Palace in New York. The exhibits are representative of practically all of the more important industries, of most interest being those shown by railroad companies and iron and steel companies. The exposition opened on Dec. 11 and will continue until Dec. 20.

The largest exhibit is that of the Army and Navy departments and the Department of Public Health of the United States government, which occupies the entire gallery. In addition to displaying photographs of all the latest devices for bringing about better conditions of public health, there was shown for the first time a series of moving picture films illustrating the progress which has been made of late by the government in this connection.

Among the companies represented at the exposition, are the following: The Allen Mfg. Co., Hartford, Conn., safety set screws and sockets; the American Abrasive Metals Co., New York, safety treads, ladder feet, etc.; the American Safety Tread Co., New York, safety devices for stairs, machine platforms, etc.; the American Patent Sales Co., New York, life boat, automobile truck axles and gas stove safety device; Barrett Mfg. Co., New York, disinfectant; Bass Bros., New York, automatic saw guards and safety guards for woodworking machinery; A. Bataille & Co., New York, folding elevator gates with patent kick plates; Benjamin Electric Mfg. Co., New York, punch press safety devices; Brown & Sharpe Mfg. Co., Providence, R. I., charts and photographs of safety appliances; Corbin Cabinet Lock Co., New Britain, Conn., bench assembling press with safety guard; Detroit Fuse & Mfg. Co., Detroit, iron clad fuse and motor starters; Draeger Oxygen Apparatus Co., Pittsburgh, pulmotors; Electrene Co., New York, fire extinguishers; M. Fink, New York, rope fire escape; Max H. Fischer, New York, patent hollow set screws and guards for stamping press; Franklin Railroad Supply Co., New York, locomotive fire doors; General Electric Co., Schenectady, N. Y., models, photographs and charts of safety devices for various kinds of electrical machinery; L. F. Grammes & Sons, Allentown, Pa., safety guards for wood-working machinery; Hess Steel Casting Co., Philadelphia, safety car wrenches; Julius King Optical Co., New York, safety eye glasses; F. W. King Optical Co., Cleveland, safety eye glasses; H. & A. Lock Co., Brooklyn, N. Y., safety devices for power and foot presses; McNutt Non-Explosive Can Co., New York, non-explosive cans for inflammable liquids; National Cash Register Co., Dayton, O.; National Lamp Works of the General Electric Co., Cleveland; Never Slip Safety Lamp Co., New York; New Jersey Zinc Co., New York, models and photographs of safety devices used in the zinc industry; New York Edison Co., New York; Norton Co., Worcester, Mass., safety and sanitary appliances for grinding wheels; Patent Scaffolding Co., New York, safety scaffolds; Peele Co., New York, freight elevator door; Pressed Metal Radiator Co., New York; John Quern, Brooklyn, water sterilizers employing ultra-violet ray; August C. Schwager, New York, safety thermal gas cut-off; Stark Car Coupler Corporation, Strasburg, Pa.; Thermo Gas Cut-Off Co., New York; United States Steel Corporation, safety appliances in the mills, photographs illustrating sanitation and welfare work and colored pictures of company houses; Universal Safety Tread Co., New York; Welin Marine Equipment Co., Long Island City, marine safety devices; West Disinfecting Co., New York, disinfectants; Westinghouse Electric & Mfg. Co., West Pittsburgh, Pa.; T. A. Willson & Co., Inc., Reading, Pa., safety eye glasses.

The Pennsylvania railroad and New York Central have large exhibits showing automatic signal stops, comparisons between efficient and defective tools, ropes and chains and models showing the proper methods of piling and packing goods for shipment. The other railroads having exhibits are the Chicago & Northwestern, and the Southern Pacific. Numerous life insurance companies show various charts and diagrams relative to industrial accidents and hygiene.

Australia, Austria-Hungary, Belgium, France, Great Britain, Germany and Switzerland, all are represented by official governme t exhibits. Various German and English manufacturers also have separate exhibits. A prominent place on the first floor is devoted to the large collection of the American Museum of Safety.

IRON MINING NEWS

Cuyuna Range Activity

Brainerd, Minn., Dec. 16.—Drilling is very active on the range and in addition many new places are being explored. The new territory in Allen and Emily townships continues to attract attention. The newly organized Cuyuna-Ore Land Co. has many interests in the section, and Duluth and Superior people are interested in the work being done in that section. Cuyler Adams has a drill in section 9, township 43, range 32. B. B. Gaylord is drilling in section 16, township 43, range 32. A drill has been moved from the 120-acre Coleman farm in section 32, township 47, range 29 to section 34, township 47, range 29. P. J. Long, of Ironton, John McManus, of Deerwood, and other range people are interested in this company. The Crow Wing Iron Co., in which Mayor Vibert and other Cloquet people are interested, has struck ore where its drill is operating in section 6, township 46, range 29. John McAlpine, J. C. Campbell and James Joyce interests are in iron with their drill in the south half of the southeast quarter of section 3, township 46, range 29. Judge James T. Hale, of Deerwood, had a drill at work in section 31, township 46, range 28. Bob McMenemy, the railway contractor, on Monday moved his outfit to Cuyuna to commence work on the line which will run on the south side of Rabbit lake and on to the timber shaft of the Kennedy mine. Railway work so near Cuyuna will give increased activity to industrial lines in this range town. John Helmer, of Duluth, heavily interested on the range, has been very sick for a couple of weeks. James A. Stetson, of Duluth and Deerwood, has several mining deals under way, and reports many inquiries for mining properties.

The Plymouth Exploration Co. is operating a Star drill in section 27, township 47, range 29. A 6-inch casing is used. So far the drill has cut more rapidly than a diamond drill. There is no core, the stuff coming up in chunks and not being pulverized as when handled by a diamond drill. The drill is now down 140 feet and is said to be 40 feet in the ledge. It traveled 25 feet in five hours through very hard formation. The Star drill has been successfully used in the oil lands and, if successful on this trial venture in the iron fields of the Cuyuna range, it may mark the beginning of a change in drill methods.

William Rock, Pat Hammel, Oscar Fleer and others on Tuesday received checks in Duluth for the sale of their interests in the Harker holdings in section 22, township 47, range 29, the Northwestern Improvement Co. being the alleged purchaser. Rock is said to have been paid $14,000, Hammel $12,000 and Fleer $12,000. The Helmer Exploration Co. drill working in the northeast quarter of the northeast quarter of section 16, township 46, range 28 is still in the surface. John Helmer's drill jn section 11, township 46, range 28 is still in the surface. Pat Hines has two drills in section 10, township 46, range 28. G. S. Wyman, of Anoka, has a drill in section 30, township 46, range 29. The Carlson Exploration Co., of Hibbing, of which Gus Carlson is the range representative, is doing the drilling.

The Mangan Iron & Steel Co., whose lands in section 10, township 46, range 29, were being drilled by W. A. Guith, has ceased drill operations for a short time. It is reported work will be resumed some time this month.

The Inland Steel Co. is putting in a new cut to its pit at Thompson mine. The Pennington mine has a shovel at work. They loaned one shovel to the Rowe mine at Riverton and the latter mine is working its hydraulic plant and the steam shovel equipment.

The Soo line is putting in a two-stall roundhouse at Riverton. Twenty-two houses are being erected at Riverton by one contractor.

The Brainerd city council will advertise for bids for leases on its iron lands in the city. There is a tract on the south range and in the line of attraction of the Brainerd-Cuyuna Mining Co. mine, which was bequeathed to the city by the late Judge G. W. Holland, and operators will be asked to give their bids for mining it on a royalty basis. The city also owns 80 acres north of the Parker & Topping foundry said to have mineral indications, and the city will also have this explored, the aim being to put both properties in shape to pay dividends to the city and thus reduce taxation and go towards the internal improvement of Brainerd. The city will on January 6, 1914, vote on the question of issuing $75,000 bonds to build a city hall. The county is agitating the question of a new court house. To offset this charge and increased indebtedness is an asset in the shape of the county poor farm, said to be rich in mineral wealth. This tract alone would more than pay for a $200,000 court house, and its royalties would do much to lower rates of taxation in the county. Several bids for leasing the property were made at the last meeting of the county commissioners.

Some men who have been laid off at the Cuyuna-Mille Lacs mine were immediately put to work at the Cuyuna-Duluth mine in Ironton. The Cuyuna-Mille Lacs Iron Co. will continue vigorously to push the work during the entire winter. It will soon have everything in first-class shape for stockpiling and expects to have a stockpile of 70,000 tons by spring. Ore will also be shipped in different amounts by rail. Last week 1,500 tons of ore were shipped to the Lake Superior Iron & Chemical Co.

The Cuyuna-Iron Valley Mining Co. has just secured options for leases on lots 1, 2 and 3 of section 20, township 47, range 28 from George Dehning and wife, Chris Dehning and wife and Emma Ramsey and Guy Ramsey. It is a well known fact that there has been some valuable ore discovered just north of this property. The Duluth-Brainerd shaft in section 32, township 47, range 29 is going down very fast. The workmen expect to be in ledge by the last of the week.

The Iron Mountain town site is attracting considerable interest because of the great development of mineral lands tributary to the town. General stores, residences and other buildings will soon be under construction and an open winter will insure a lot of building at this new town site. A good hotel will also be built at an early date. Frank E. Oberg and Donald Quinlivan, with a party of stockholders in the Gopher Iron Co. recently toured the range viewing their different properties, including the Pennington open pit mine where this company owns an interest in the fee.

The Potts Exploration Co. is drilling in section 4 of the town of Deerwood. The property of the Cuyuna Iron & Manganese Ore Co. near Crosby and adjoining the Pennington pit mine has been well drilled.

MEN OF THE IRON TRADE

F. WENDEMUTH, of Alfred H. Schutte & Co., Cologne, Germany, who came to this country to study American machine tools, recently sailed for home.

R. J. SOUTHWELL was recently appointed to succeed the late R. B. Esten in charge of the New York office of the Clinton Wire Cloth Co., 261 Broadway.

W. T. CUTLER has been elected a director of the American Brake Shoe & Foundry Co. to succeed E. H. Fallows, who resigned recently. The other directors were re-elected.

T. T. RICHARDS was recently appointed assistant sales manager of the Wagner Electric Mfg. Co., St. Louis. He has been associated with the company's sales department for several years.

JOSEPH MONFORTS, a textile machine manufacturer of Germany, recently sailed for Europe, after a four week stay in the United States, during which time he had been looking into machine tools.

E. FRANK PLATT, vice president and treasurer of the Platt Iron Works Co., Cincinnati, has resigned his position, remaining a member of the board of directors. He has been with the company 13 years.

CHARLES W. ALLEN, manager of the railroad department, of the Reading-Bayonne Steel Castings Co., Reading, Pa., has been made vice president and director of the Reading Specialty Co., recently organized to sell the products of that company.

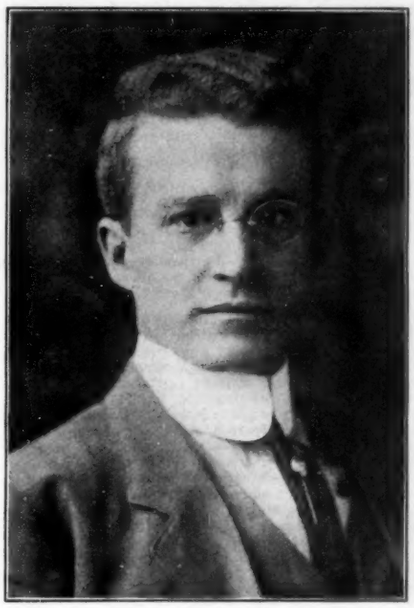
HENRY U. STORRS, formerly connected with the sales department of the Chapman Valve Mfg. Co., Indian Orchard, Mass., has accepted the position of manager of the Boston office of the company, to fill the vacancy caused by the resignation of H. L. De Wolfe.

PAUL NEGRIER, a civil engineer of Paris, France, is visiting a number of cities in this country, having been commissioned by the French minister of commerce and industry to make investigations of American methods of handling various municipal problems of public works.

W. L. MILES, formerly sales manager and secretary of Wickes Bros., Saginaw, Mich., has been elected a director and vice president of the Jackson & Church Co., Saginaw. This company recently added several lines of heavy machinery, in the sale of which Mr. Miles has had extensive experience.

R. A. OGLESBY, South Bend, Ind., was elected president by the National Gas Engine Association at its Toledo meeting last week. Other officers as follows were elected: Vice president, Henry Lauson, New Holstein, Wis.; treasurer, Otto M. Knoblack, South Bend; secretary, H. R. Brate, Lakemont, N. Y.

JOHN P. FREY, of Cincinnati, editor of



D. F. S. CLARK

the International Iron Molders Journal, delivered a lecture last week before the students of the University of Chicago, the subject being "The Trades Union Movement in Cincinnati." Mr. Frey is one of the best known figures in labor circles in that city.

PHILIP H. MOORE, mining engineer and manager for the Canadian Allis-Chalmers, Ltd., mining, crushing and cement machinery department, has become general manager of Rock & Power Machinery, Ltd., Toronto, with branch offices in Halifax, Montreal, Sudbury, Cobalt, Winnipeg, Calgary and Vancouver.

W. W. WILLIAMS, district sales manager for the Bourne-Fuller Co., Cleveland, with offices at 2144 Oliver building, Pittsburgh, has resigned to accept a position Jan. 1, with the A. M. Byers Co., Pittsburgh. He will be succeeded by H. P. Roby, who is identified with the Pittsburgh office of the Bourne-Fuller Co.

THOS. W. ALLEN was elected president at the annual meeting of the Cincinnati Manufacturers' Association, which was held on Dec. 9 in Cincinnati. Other officers elected were: Vice president, Joseph E. Durrell and secretary and treasurer, John W. Irvine. Reports from the various committees show that the organization has made satisfactory progress during the past year.

W. HUME LOGAN, president of the Dow Wire & Iron Works and James Clark Jr., president of the James Clark Jr. Electric Co., are representatives of the Louisville machinery trade on the workmen's compensation committee of the Kentucky Manufacturers' and Shippers' Association, which will present a bill on this subject to the next session of the state legislature in January.

D. F. S. CLARK, who, as was announced in these columns last week, has resigned as secretary of the Boston branch of the National Metal Trades Association, took up the duties of secretary on March 12, 1906, and has served with efficiency for the unusual period of more than seven years. Mr. Clark will become associated with J. C. Pushee & Sons, brush manufacturers, of Boston.

ANTOINE THIEUX, chief engineer of the International Sleeping Car Co., which is operating in various European countries, now is in this country inspecting the plants of car builders with a view of introducing some of the all-steel types of sleeping cars on European railroads. Mr. Thieux expresses the opinion that the European railroads sooner or later will follow the lead of the American systems and substitute all-steel cars for wooden ones.

VIGOROUS FIGHT

Will be Made on Proposed Advance of Coke Rate.

Washington, Dec. 16.—Vigorous opposition to increased rates on coke to the eastern furnaces is to be made at the hearings of the so-called 5 per cent advance rate case of eastern railroads, now pending before the Interstate Commerce Commission. It has been indicated that the fight against higher rates on coke to the eastern furnaces will be extended to include all coke rates in the affected territory to the mills embraced therein. Further, the opposition promises to spread to coal and ore rates generally throughout the area involved.

Attorney William A. Glasgow, of Philadelphia, who gave notice to the commission at the resumed hearing of the railroads' case last week that he would appear as an intervener to protest against increased rates on coke to the eastern furnaces and on increased cement rates, told a representative of The Iron Trade Review that the Connellsville-Buffalo coke rate of $1.85 is out of all proportion to an equitable adjustment, and this rate, as well as others to furnaces in the Lehigh valley, will be the object of strong attack.

The rate to the Buffalo district has climbed from $1.50 in 1902 to the present rate of $1.85.

The commission in a series of opinions on coke rates last May held that the Buffalo rate was not unreasonable, and at the same time upheld the Connellsville-Chicago rate of $2.50, but did reduce the rates from Connellsville to Ohio, Pennsylvania, New Jersey and Maryland furnaces.

The complainants in the Buffalo district case were the Wickwire Steel Co., et al. They have succeeded in being granted their petition for a rehearing, which is set for Jan. 9, in Washington. Whether the complainants in the case against the $2.50 rate to Chicago will reappear to protest has not been made known. These complainants were the Inland Steel Co. and the Wisconsin Steel Co.

Control Patents.—The J. W. Frazier Co., Rockefeller building, Cleveland, controls the patents on the type of blast furnace skip hoist installed at the plant of the Globe Iron Co., Jackson, O., and described elsewhere in this issue.

NEW BUSINESS

In New York, the machinery market continues devoid of features of importance. Some dealers report a better volume of sales last week, but in general the market continues unchanged, and business is still considerably below normal. The only railroad which has closed for machinery requirements lately is the New York, New Haven & Hartford, and its purchases were small, involving only a few tools. The New Haven is still in the market for a coach wheel lathe and a cylinder boring machine. Electrical manufacturers, who have been comparatively liberal buyers during the past few months, appear to be closing down as much as possible on their purchases.

In Cincinnati, business done by machine tool manufacturers during November has not been as good as in October, although it was very unsatisfactory during the latter month. Very few shops are running 60 per cent or over of their full capacities, and it probably would be safe to say that 60 per cent of the machinists employed by machine tool makers in this city are idle at the present time. The only order of consequence taken recently was for 20 lathes and a number of radial drills and shapers, which will be furnished by the American Tool Works Co., this city, for the manual training schools in Chicago. A number of the manufacturers here express their belief that the railroads will begin to buy after the first of the year, as they have had their lists out before the trade for some time. Business done in second-hand machinery during November was about equal to that done in October, but it has not been satisfactory during either month. A slight let-up in small electrical equipment within the past two weeks is also generally reported.

ARIZONA

PRESCOTT.—A $95,000 bond issue has been voted for a new polytechnic high school. High school board will select architect.

CALIFORNIA

LOS ANGELES.—The public works board rejected all bids received for structural steel for the 1,800-foot freight shed to be erected by the city on municipal dock No. 1. New bids will be called for. Estimated cost $120,000.

SAN FRANCISCO.—The railroad commission has granted the California Telephone Co. authority to issue $160,000 in bonds. Of this amount $128,000 will be expended for additional equipment and new construction.

COLORADO

DENVER.—The American Furniture Co. will let contracts for the construction of a four-story warehouse estimated to cost between $75,000 and $100,000.

CONNECTICUT

BRIDGEPORT.—The Housatonic Machine & Tool Co. plans a one-story, 40 x 42-foot factory.

SEYMOUR.—The Kerite Metal Wire & Cable Co. recently awarded contracts for a three-story brick factory estimated to cost about $50,000.

DELAWARE

BELLEVUE.—The Breakwater Co. plans to have specifications prepared soon for rebuilding its plant here recently damaged by fire. Architect has not yet been selected. Address care C. H. Ehrnstrom, Lafayette building, Bellevue.

DISTRICT OF COLUMBIA

WASHINGTON.—Sealed proposals will be received at the office of O. Wenderoth, supervising architect, treasury department, until Jan. 19 for the construction complete, including mechanical equipment of the United States post office at Bellaire, O.

WASHINGTON.—Sealed proposals will be received at the Bureau of Yards and Docks, navy department, until Dec. 27, for a structural steel crane runway and supporting columns and girders for building No. 40 at the navy yard, Boston. Estimated cost, $3,800. Plans and specifications may be obtained upon application to the bureau or the commandant of the navy yard named.

WASHINGTON.—Sealed proposals will be received at the office of the general purchasing officer, Isthmian canal commission until Dec. 30 for furnishing the following: Cutter and ladder-head parts for dredge, pig iron, steel, locomotive tires, copper condenser tubes, galvanized conduit, graphite and core wash. Further information relating to these requirements (Circular No. 813) may be obtained upon application to F. C. Boggs, major, Corps of Engineers, U. S. A., general purchasing officer.

WASHINGTON.—Sealed proposals will be received at the office of the general purchasing officer, Isthmian canal commission until Dec. 26 for furnishing the following supplies: Wire cable, steel and iron pipe, pipe fittings, tire steel, rivets, bolts, screws, chain links, files, blacksmith's punches, pliers, wrenches, tinner's shears, valves, magnesia pipe covering, etc. Further information relating to these requirements (Circular No. 812) may be obtained upon application to F. C. Boggs, major, Corps of Engineers, U. S. A., general purchasing officer.

GEORGIA

HELENA.—The Helena Ice Works will rebuild its plant recently damaged by fire. The new building will be 36 x 72 feet, of mill construction. The company will use its present machinery.

ILLINOIS

ALBION.—The Royal Home Canner Co. has been incorporated; canning machinery; $25,000; by G. W. Brince, W. S. Rothrock and Charles L. Boyles.

BELVIDERE.—The Illinois Northern Utilities Co., Chicago, recently purchased a site here, upon which it plans to erect a power plant to cost approximately $500,000.

CHICAGO.—The Central Iron & Metal Co. has increased its capital stock from $15,000 to $100,000.

CHICAGO. — The D. McAllister Boiler Works will build an addition 50 x 110 feet to its plant here. J. Neeble, architect.

CHICAGO.—The Bullock Tractor Co. has been incorporated; $100,000; by Henry E. Bullock, James E. Bullock and William O. Wayman.

CHICAGO.—Lyon, Greenbaum & Anderson have been incorporated; machines and machinery; $25,000; by C. Leviton, A. Lamb and J. Lowenhaupt, Chicago.

CHICAGO.—The American Metal Molding Co. has been incorporated to manufacture metal moldings and other metal products; $100,000; by Roscoe L. Harkinson, Clifford W. Snyder and Eugene G. Fassett.

MORTON.—The Getz Power Washer Co. has been incorporated; washing machines; $25,000; by John B. Getz, George T. Bean and Hiram E. Todd.

STERLING. — The Superior Machine Co. has been incorporated; $35,000; by A. B. Cooling, W. A. Cooling, P. W. Dillon and George Becker.

INDIANA

WINCHESTER.—Henry F. Wood, auditor Randolph county, will open bids Dec. 20 for the construction of a bridge in West river township.

IOWA

MARSHALLTOWN.—The Central Foundry Co. has been incorporated; $6,000; by R. H. McDowell, president and general manager, and E. H. Keller, secretary and treasurer, and Thomas Kopp, Salem, O.

KENTUCKY

PRINCETON.—The Illinois Central railway will erect a round house here at an estimated cost of $70,000. A. S. Baldwin, Chicago, chief engineer.

LOUISIANA

MONROE.—The Vicksburg, Shreveport & Pacific railway recently awarded contracts for the enlargement and improvement of its shops here at a cost of about $50,000. L. B. Ferguson, master mechanic.

MARYLAND

BALTIMORE.—The school board has been allowed $80,000 for a new school house to be erected next year.

BALTIMORE.—The city will purchase from 8 to 11 pieces of motor apparatus for the fire department. The board of estimates has appropriated $40,000.

ELKTON.—Cecil county comtemplates the erection of a new court house at an estimated cost of $100,000.

MASSACHUSETTS

BOSTON. — The Shawmut Electric Signal Co. has been incorporated; electric and magneto signals; $300,000; by James B. Cloglier, Edward L. Parsons and James M. West.

SOUTH LAWRENCE.—The public service commission has ordered the Boston & Maine railroad to install an interlocking system here at an estimated cost of about $153,000. A. B. Corthell, Boston, chief engineer.

WORCESTER.—The Morgan Construction Co. plans a one-story rolling mill, 110 x 118 feet. Estimated cost about $15,000.

WORCESTER.—The Rivet Lathe Co. plans to erect a factory building, plans for which have been prepared by Frost & Chamberlain. The company manufactures rivet lathes, grinders and milling machines.

MICHIGAN

BAY CITY.—The board of education has under consideration the erection of a high school to cost about $175,000.

DETROIT.—The Kerr Machinery Co. is having plans prepared for the construction of a four-story power building to be 62 x 138 feet, estimated to cost about $100,000. Albert Kahn and E. Wilby, Trussed Concrete building, architects.

THREE OAKS.—The managers of the municipal electric light plant will purchase two engines, a generator, two exciters and a switchboard. R. E. Schmuhl, engineer.

MINNESOTA

DULUTH.—The Garden Lake Iron Co. has been incorporated; $500,000; by Henry Turrish, R. J. Ryan and H. N. MacHarg, Duluth.

MINNEAPOLIS.—The United States Register Co. plans to erect a two-story brick factory estimated to cost $13,000.

ST. PAUL.—The Rogers Co., Chicago, is preparing plans for the St. Paul plant of the Standard Oil Co. Plans call for four reinforced concrete buildings.

MISSOURI

ST. LOUIS.—The Electric Co. of Missouri plans to erect three sub-stations and about 50 miles of 13,000-volt transmission lines and to purchase material for a distribution system. J. E. Hillmeyer, engineer.

NEBRASKA

OMAHA.—The Midwest Iron Works has been incorporated; $9,000; by Andrus C. Peterson, George Messersmidt, Arthur C. Thomsen and E. N. Abbott.

NEW JERSEY

BAYONNE.—The Bayonne board of trade is interested in a plan to erect a bridge over Newark Bay from Bergen Point to Elizabethport at an estimated cost of $2,000,000, to be paid for by the Jersey Central, the Pennsylvania and the Lehigh railroads and Hudson and Union counties.

CAMDEN.—The Charles P. Biggan Co. has been incorporated to carry on the business of structural and ornamental iron, steel and wire works; $150,000; by Charles P. Biggan, Howard P. Forest and Charles R. Mullan.

JERSEY CITY.—The Duplex Razor Co. has purchased a site, 125 x 192 feet, on the northwest corner of Baldwin avenue and High street, and proposes to break ground at once for the erection of a factory.

NEWARK.—The Atha Tool Co., manufacturer of artisans' tools, will erect a brick and concrete boiler house and make improvements to its plant here.

NEW YORK

BROOKLYN.—The Bay Ridge Pure Ice Co. has purchased a site here, upon which it plans to erect an ice manufacturing plant estimated to cost $50,000. A. R. Piper, president.

BUFFALO.—Bids are being received by the Lackawanna railroad for the erection of a station here estimated to cost about $3,000,000. G. J. Ray, Hoboken, N. J., chief engineer.

BUFFALO.—The Herr Mfg. Co., recently incorporated, will erect a shop for the manufacture of billets, patterns and foundry supplies. Harvey S. Herr, president.

GENEVA.—The Phillips & Clark Stove Co. will erect a four-story, 60 x 100-foot addition to its factory here.

MANHATTAN.—The American Combustion Co. has been incorporated; foundry and factory supplies; $50,000; by James P. Hogan, Edgar Trentesean and Neville Cain, 470 West 157th street, New York City.

NEW YORK CITY.—The American Ever-Ready Co., which is now located on Hudson street, between Spring and Vandum streets, has purchased the block bounded by Thompson and Nott avenues and Orton and Manley streets, Long Island City, and will erect a new eight-story building. The block has a frontage of about 200 feet on the avenues and 600 feet on the streets, and about half of it will be covered by the proposed new structure. The company manufactures electric lamps, batteries, meters and automobile supplies. The new factory will be ready for operation in something over a year.

SCHENECTADY.—The Daly Brothers Mfg. Co. has been incorporated; machinery; $20,000; by William L. Daly, Frank A. Daly and John A. Daly, 24 Columbia street, New York City.

TONAWANDA.—The Buffalo Steam Pump Co. plans to erect a brick building here at an estimated cost of $20,000, contract for the construction of which was recently awarded to Morris & Allen, Buffalo.

NORTH CAROLINA

SCOTLAND NECK.—The city will enlarge the electric light and power plant and contemplates installing duplicate equipment. A 200-kilowatt generator with exciter and switchboard, 300-horsepower engine and a 200-horsepower boiler, will be installed.

OHIO

ASHTABULA.—The Template Co., of Ashtabula, O., has been incorporated with a capital stock of $20,000 to manufacture foundry supplies. H. B. Ash, F. W. Stone and P. F. Good are among the incorporators.

BREWSTER.—The Wheeling & Lake Erie Railroad Co. plans to erect a reinforced concrete building here at an estimated cost of $100,000, contract for which was recently awarded. R. H. Evans & Co., Columbus, contractor.

CANTON.—The Federal Clay Products Co. will expend between $60,000 and $100,000 for its new building to supplant the one destroyed by fire recently, and for the centralization of the power system. Estimates are now being made. The company has four plants in operation, and under the present system power for each is furnished separately. This system will be abandoned, and a new 1,000-horsepower plant will be erected to supply the required power for the four buildings.

CINCINNATI.—The Hale Garment Machine Co. has been incorporated; $50,000; by D. C. Hale, Jr., Henry Schuchardt, John D. Storrs, William H. Schuchardt and D. C. Hale.

CINCINNATI.—The Dyne Mfg. Co., Cincinnati, has been incorporated with a capital stock of $10,000, to manufacture a scale remover and dynamo cleanser. Among the incorporators are J. J. Roher, E. L. Sherwood and O. H. McMacken.

CINCINNATI. — Negotiations have about been completed by the Linde Air Products Co., of New York City, for the location in Oakley, a manufacturing suburb of Cincinnati, of its proposed plant in that city. A special kind of building will be erected suitable for the manufacture of the products of the Linde company, which will cost about $30,000.

CINCINNATI.—Plans have been filed with Major L. H. Rand, of the United States engineering corps stationed at Cincinnati, for the reconstruction of the Muskingum river bridge at Marietta, O., and also for the reconstruction of the Muskingum river bridge at Lowell, O. The former bridge will be built by the city of Marietta and the latter by the commissioners of Washington county. Both will be of steel construction. Hearings have been arranged by Major Rand for Dec. 18.

CLEVELAND.—The Leisy Brewing Co. is having plans prepared for an addition to its plant here. It will be of brick and steel estimated to cost $100,000. Louis Lehle, Chicago, engineer.

COLUMBUS.—The Direct Drive Axle Co. has been incorporated with a capital stock of $10,000 to manufacture transmissions. W. E. Campbell, C. O. Haines and C. T. Phillips are among the incorporators. It is probable that a small amount of equipment will be required.

DELPHOS.—The Delphos Metal Post Co., of Delphos, O., has been incorporated with a capital stock of $30,000 to manufacture metal posts. Among the incorporators are F. X. Altenberger and John H. Meyers, both of Delphos, O.

FREMONT.—The Crescent Mfg. Co. is to be reorganized and incorporated on a larger scale. The company manufactures safety razors. C. H. Grett and Frank Naugle are the principal owners.

LOVELAND.—Commisisoners of Clermont county, Batavia, will build an iron bridge in this city at a cost of about $20,000.

MIAMISBURG.—Commissioners of Montgomery county, Dayton, have decided to erect two bridges here at a cost of $100,000.

MT. VERNON.—The Hope Engineering & Supply Co., Pittsburgh, plans to erect a one-story brick and steel 90 x 200-foot addition to its plant here. The new building will be used for machine shop purposes. Estimated cost, $75,000.

NILES.—The Wilson Mfg. Co. will buy the building and site formerly occupied by the Economy Lamp Co., to be used for the manufacture of sheet metal specialties. H. P. Knoblock is head of the company.

PIQUA.—The Meteor Motor Car Co. plans to move to this city from Shelbyville, Ind., and will occupy the building vacated by the Sprague Smith Furniture Co. The company will annul its Indiana charter and incorporate under Ohio laws with a capital of $50,000. The Indiana plant has a capacity of three cars per day, but this will be increased to 14 cars. Maurice Wolf is head of the concern.

TOLEDO.—The Toledo Auto Cycle Co. has been incorporated; motor vehicles; $20,000; by A. L. Mayer, Thad S. Powell, John J. Kail, Carper W. Neilson and Nat Smalley.

YOUNGSTOWN.—Plans for the proposed bridge over Andrews hollow in Crandall park have been completed by the city engineer. It will be a 300-foot concrete structure estimated to cost $65,000.

OKLAHOMA

ELK CITY.—The city will drill four wells for water system to cost $10,000. Equipment will include three pumps, dynamo, three motors, carload of vitrified pipe and 2,500 feet two-inch pipe to carry water from wells to

Gray Iron Castings

Foundry 160 x 80

Castings up to 10 Tons

Pattern shop complete in every detail. General Machine Work, turning up to 16 ft. in diameter. Modern shop 400 x 80.

The Adamson Machine Co.
AKRON, OHIO

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ENGINEERS
All Kinds of Power Plants
SPECIALISTS in the Industrial Application of PRODUCER GAS
MILWAUKEE Wells Bldg. **CHICAGO** 1st National Bank

TISCO MANGANESE STEEL CASTINGS
FOR SEVERE SERVICE
Taylor-Wharton Iron & Steel Co.
High Bridge, New Jersey

MILLIE MINE LEASE AND EQUIPMENT
For Sale at Auction
On December 20, 1913, at 11 o'clock A. M.
At the Mine Office on the Property, Iron Mountain, Michigan

This valuable property, comprising 60 acres of ore bearing lands is bounded on the North by the Chapin Mine, and on the East by the Walpole Mine. These important and well known mines have developed large bodies of bessemer and non-bessemer ore up to their boundaries with the Millie, and recent reports estimate that large quantities of these ores can be mined on the Millie from these leases within the life of the lease, which expires in 1919.

The Mine is equipped and in working order. Royalties range from 10 to 25 cents per ton according to grade; prepaid royalties amounting to over $33,000 go with the sale.

Responsible purchaser may distribute 75 per cent. of payments semi-annually over three years.

FOR PARTICULARS ADDRESS

S. J. McGREGOR, Superintendent
The Dessau Mining Company
Iron Mountain, Mich.

The Rolling Mill Industry

By F. H. KINDL, Engineer

A Condensed, General Description of Iron and Steel Rolling Mills and Their Products.

Cloth, Illustrated . . . $2.00
Full Flexible Leather, $3.00

In this work the author has endeavored to give a condensed, general description of iron and steel rolling mills and their products, without discussing the details of rolling any special material. Essentially, it is a summary of American rolling mill practice, its development being traced from the beginning to the present day.

An effort has been made to define more closely the various mills and their products and the various classifications herein presented have been approved by leading manufacturers and many of the country's foremost iron and steel engineers.

The charts which graphically show the production of semi-finished and finished products, from 2,000 pounds of iron ore, 1,000 pounds of coke and 600 pounds of limestone represent modern practice at some of the largest open-hearth plants and rolling mills. Charts also are included to clearly illustrate the amounts of material charged and produced in making one ton of pig iron; the distribution and production of iron and steel in 1907 and 1911; the conversion of pig iron into the various finished products, etc.

For those interested in the economics of the iron industry, a table has been prepared in which a comparison has been made of the general fundamental factors dictating the production of pig iron in the United States, Germany and Great Britain, with particular reference to the Pittsburgh district of the United States, the Rheinland-Westfalia district of Germany, and the Cleveland district of Great Britain.

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filter basin. Carl L. Reid, Elk City, engineer; J. B. Winn, city clerk.

OREGON

PORTLAND. — The Northwest Steel Co. has had plans prepared for a two-story plant in South Portland to cost about $40,000.

PORTLAND.—A 25-year franchise to G. F. Heuser for an electric street car line in the city has been granted by the city council.

PORTLAND.—The contract to install power plant in Pittock building has been awarded to Chas. C. Moore & Co., San Francisco, for $80,000.

PORTLAND. — The contract for building the steel hull for the dredge Columbia has been awarded to the Willamette Iron & Steel Works at $46,000.

PORTLAND.—The Pacific Furniture Specialties Co. will build a plant on 3-acre tract at E. Twenty-seventh and Morgan streets. Company has just been incorporated for $100,000.

PENNSYLVANIA

McKEESPORT.—The United States Wire Wheel Co. has been incorporated to manufacture wheels for all kinds of vehicles; $100,000; by George Baehr, Simon Kalstone, Thomas J. Lewis and W. M. Nowell, McKeesport.

PHILADELPHIA.—Henry A. Hitner's Sons Co. are planning a brick, stone and concrete power house, a storage building and a boiler shop in connection with their iron foundry.

PHILADELPHIA.—The Union Petroleum Co., whose plant was damaged by fire, will rebuild the engine and boiler house at a cost of about $10,000. The new building will be 40 x 70 feet.

PHILADELPHIA. — The Belmont Iron Works has awarded a contract for the erection of a two-story brick vault to be built at its plant on Twenty-second street and Washington avenue.

PHILADELPHIA. — The Turner Concrete Construction Co. has received a permit for the erection of a two-story brick and reinforced concrete engine and boiler house and washroom, 40 x 70 feet, for the Union Petroleum Co., Philadelphia.

SHARON.—The Valley Mould & Iron Co. is erecting a concrete trestle 35 feet high and 300 feet long from the railroad track to the foundry to be used as a storage trestle.

SOUTH CAROLINA

BEAUFORT.—Beaufort and St. Helena Island townships plan a 1,585-foot bridge over the Beaufort river here to cost, including causeway and approaches, $67,315.

SOUTH DAKOTA

ABERDEEN.—Bids will be received until Jan 6 by Brown county commissioners for the following bridge work: 60-foot and 80-foot bridges over Elm river; 60-foot bridge over James river; 80-foot span to replace Bridge No. 4 over James river; 40-foot span over Mud creek. J. J. Roberts, county auditor.

TENNESSEE

LAFOLLETTE.—The Lafollette Steel Co. has been incorporated with a capital of $3,000,000. The company proposes to erect a steel plant here.

TEXAS

DALLAS.—The Meier Cotton Harvesting Machinery Co. has been incorporated; $25,000; by John Meier, T. S. Miller Jr. and S. A. Stemmens.

DALLAS.—The Liquid Carbonic Co. has had plans prepared for a factory, warehouse and office building here estimated to cost about $140,000.

SWEETWATER.—The Gulf, Texas & New Mexico railroad recently secured a site of 700 acres here for terminals, additional town site, etc.

UTAH

OGDEN.—The Devine Safety Razor Co. has been incorporated to manufacture razors, cutlery and other articles from iron, steel and aluminum; $1,000,000; by James H. Devine, president; J. N. Spargo, vice president; Royal Eccles, secretary; C. A. Boyd, treasurer; Albert Oberheim, general manager.

VIRGINIA

RICHMOND.—The Chesapeake & Potomac Telephone Co. of Virginia, with main offices at Baltimore, plans to erect a 60 x 100-foot two-story fireproof telephone exchange here at an estimated cost of about $50,000.

WASHINGTON

ANACORTES.—At a cost of $30,000 the Coast Fish Co. will install new canning equipment and electrify the plant.

BELLINGHAM.—J. H. Bloedell, of Bloedell-Donovan Lumber Co. says mill will be electrified and a large amount of new machinery installed.

RAYMOND. — The Raymond Foundry & Machine Co. has ordered machinery to be used in its factory now under construction. The company will manufacture Selby gearless clutches.

SEATTLE.—The Coast Mfg. Foundry Co. has been incorporated; $50,000; by Gustof Johnson, Thomas A. Harper, Drexel T. Hubbard and Perry E. Greek.

TACOMA. — Officials of Gramm-Bernstein Motor Truck Co. of Lima, O., say branch factory will be erected here.

TACOMA.—Officials of the O-W. R. & N. Co. say construction on steel bridge, viaduct and freight terminals will begin in February.

TACOMA.—The Sumner Iron Works has been awarded contract for supplying machinery for mill of Booth-Kelly Lumber Co. at Eugene, Ore.

WENATCHEE.—Hyman Harris, local capitalist, has been awarded franchise to build 35 miles of interurban railroad from Malaga to Leavenworth.

WEST VIRGINIA

PARKERSBURG.—The International Harvester Co., with state branch in this city, has awarded the contract for the construction of a four-story brick and stone, 50 x 60-foot addition to its building on Ann street. Estimated cost about $25,000.

WISCONSIN

GILLETT.—The factory and power plant of the Great Northern Pail Co., supplying the municipality and business houses with current, was destroyed by fire Dec. 5. The loss is fully covered by insurance. Smith & Murphy of Green Bay, owners of the company, will rebuild at once.

GLIDDEN.—An electric light and power plant, with local distributing system, will be constructed here by the Glidden Light, Power & Water Co., which has been organized with $5,000 capital by Fred Boehm, Con. Moore, Julius Schroeder and Lopold Gibit.

GREEN LAKE.—The Sherwood Forest Hotel Co. will build a brick, steel and stucco summer hotel building for 400 guests to replace the frame structure destroyed by fire in September. Dimensions, 50 x 200 feet, three stories high. Frank C. Howard is manager.

LA CROSSE.—The Sterling Machinery Co., concrete mixing machinery, will build a new plant on a site 150 x 120 feet just purchased at 118-120 South Second street, La Crosse. Ernest F. Wege is president.

LA CROSSE.—The O. I. Newton Sons Co., of Sparta, electric light and power plant, will purchase some additional generating equipment as the result of closing a contract with the Chicago, Milwaukee & St. Paul R. R. to furnish current for its entire block and signal system between La Crosse and Mauston, Wis. Two power plants are operated and the new equipemnt is to bridge the gap.

MILWAUKEE.—Klug & Smith, engineers, were awarded the general contract for the construction of a $30,000 warehouse addition for the A. J. Lindemann & Hoverson Co., stoves and ranges, at First and Cleveland avenues.

MILWAUKEE.—The Wisconsin Telephone Co. will spend $36,000 in making extensions and improvements in the Hanvor (south) exchange, including one new exchange building at Sixteenth and Lapham streets, and considerable underground work. George C. French is district manager, Milwaukee.

MILWAUKEE.—The Schlitz Brewing Co. has commissioned Edward Kozick, architect, Alhambra building, to prepare plans for a concrete, steel and brick private garage and repair shop building, 110 x 150 feet in size, to be erected adjoining the brewery at Fourth and Galena streets. It will cost $37,000. Jos. E. Uihlein is president.